

Construction Methods AND EQUIPMENT

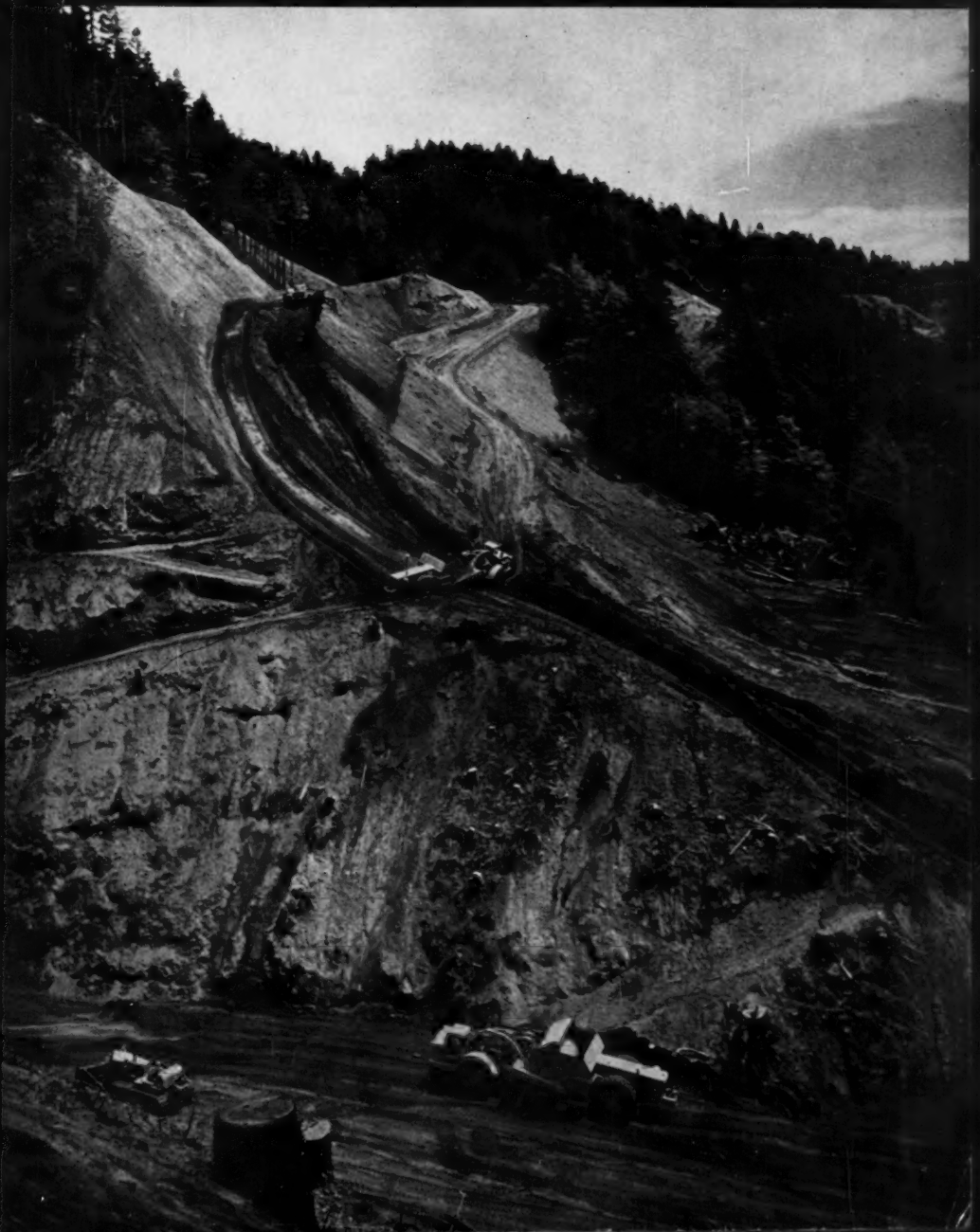
A MCGRAW-HILL PUBLICATION

MAY, 1960

PRICE \$1.00

On the "roughest, toughest job on the Pacific Coast", big scrapers negotiate ultra-steep grades to relocate a highway in Oregon. Over 4½ million yd of dirt has to be moved for the new 3½-mi road.

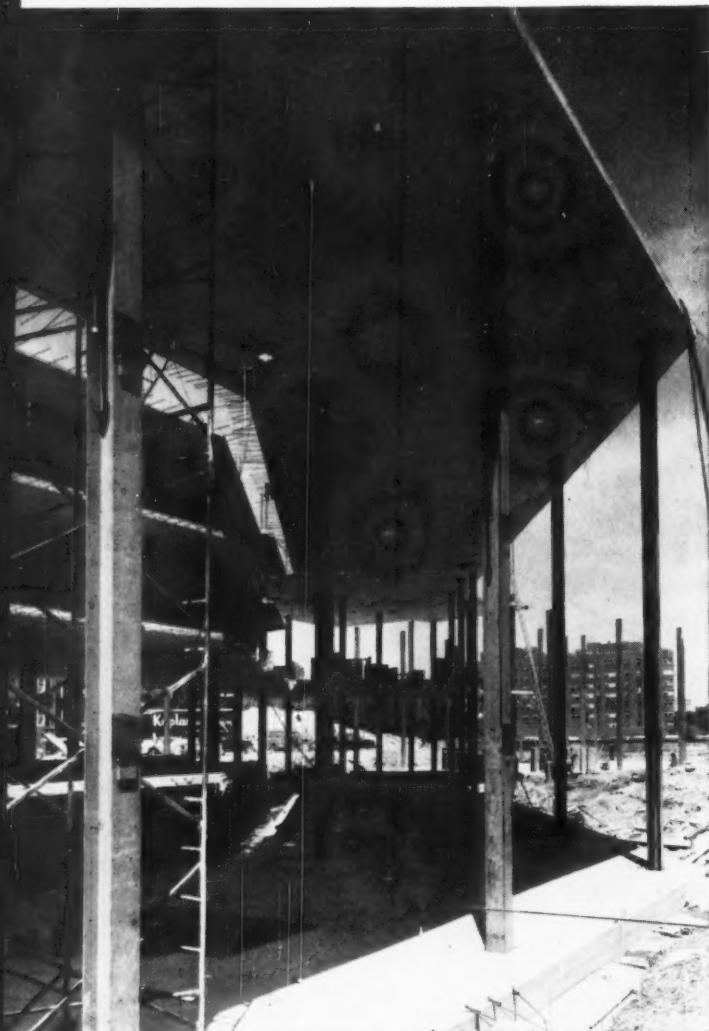
CONTENTS, PAGE 4





"We raised the roof in Chicago ... with lift-slabs of POZZOLITH concrete"

HAROLD KAPLAN, President
Kaplan Contractors, Inc. of Chicago



FIRST MULTI-STORY LIFT-SLAB PROJECT in Chicago—The "Holiday Lodge" motel—required 16 concrete slab sections, each 8" thick. A total of 80,000 sq. ft. of slab was lifted in only 2½ weeks. Concrete strength tests—made by H. H. Holmes Testing Laboratories—consistently ran from 3500 to 4000 psi at 7 days.

LIFT-SLAB CONSTRUCTION... all roof and floor slabs are placed and cured individually at ground level—in a "stack". Individual slabs are then raised to desired height by hydraulic jacks.

"Our organization is built on *creative contracting*... some call it the 'Kaplan Method'. It's a combination of know-how and know-why that helps us build better for less. On the 'Holiday Lodge' project we determined that the concrete lift-slab method of construction would provide significant structural and economic advantages.

"Concrete of uniform high flexural strength is essential to allow early lifting of the slabs without cracking. Early lifting provides significant savings in construction costs.

"The specifications called for concrete of 3000 psi at 28 days. Our past experience with POZZOLITH, confirmed by our ready-mix supplier — Material Service Corporation—indicated their POZZOLITH concrete would easily meet the specifications and would also provide the high flexural strength needed for early handling.

"We raised the roof one week ahead of schedule... and in 80,000 square feet of lift slabs there was not one crack.

"We're very pleased with the economies and excellent results—and we know that POZZOLITH helped us do a better job... faster, for less... at 'Holiday Lodge'."

For lowest cost-in-place... superior quality concrete—there's no equal to POZZOLITH. Call in the local Master Builders man to demonstrate how POZZOLITH can help put you ahead on your current job.

The Master Builders Company, Cleveland, Ohio

Division of American-Marietta Company

The Master Builders Company, Ltd., Toronto, Ontario

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"**HOLIDAY LODGE**"... architect's sketch of new \$1.5 million, 100-unit Chicago motel. Architect: Louis I. Simon • Consulting Engineer: Paul Rogers & Associates • Lift-Slab Contractor: Great Lakes Lift Co. • General Contractor: Kaplan Contractors, Inc.—all of Chicago.

POZZOLITH Ready-Mixed Concrete was supplied by Material Service Corporation, Chicago.

MASTER BUILDERS POZZOLITH*

*POZZOLITH is a registered trademark of The Master Builders Co. for its concrete admixture to reduce water and control entrainment of air and rate of hardening.

B.F. Goodrich



Hose helps dig a ditch that will detour a river

B. F. Goodrich improvements in rubber brought extra savings

THOSE machines are drilling holes for dynamite charges to blast out rock. When the job is done, a mighty river will take a detour down this newly formed channel. Power for the machines comes from compressed air, carried by hose. But on jobs like this, rubber hose used to go to pieces in no time.

When heat from the compressor got into the hose, it would harden the rubber, breaking it into loose, gummy particles that clogged the machine,

put it out of action.

B. F. Goodrich engineers went to work on the problem. By adding, subtracting and changing proportions of rubber, they found a special compound for the hose that stands heat without scorching or hardening.

Hose lined with this new rubber was made and put to work. On jobs where air hose used to go to pieces in weeks, B. F. Goodrich hose now lasts months, even years.

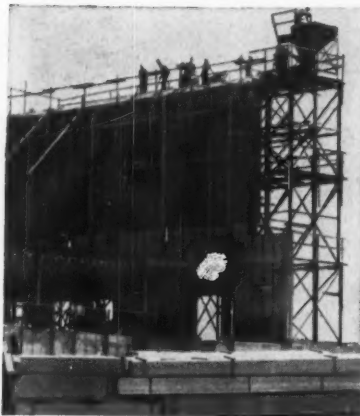
Thousands of feet of B. F. Goodrich

air hose are in constant use on this job. It's been doing dozens of different jobs, and lasting longer doing them, even though it's dragged over rough, jagged rocks, soaked in water, sometimes battered by flying pieces of rock.

Your B. F. Goodrich distributor has the exact specifications for the B. F. Goodrich air hose described here. And, as a factory-trained specialist in rubber products he can answer your questions about all the rubber products B. F. Goodrich makes for industry. *B. F. Goodrich Industrial Products Co., Dept. M-831, Akron 18, Ohio.*

B.F. Goodrich *industrial rubber products*

Saved! One Month



Extensive Use of Symons Steel-Ply

...Speeds Work on "Rush" Job

New, non-military, air route traffic control center building near Fremont, California will help control and direct aircraft, prevent collisions, and guide "lost" planes over a wide western area.

J. H. Pomeroy & Co., Inc. San Francisco was the contractor.

The project was unusual because of the speed with which it had to be erected. The building is perhaps the first non-military structure in the west that has been designed to withstand atomic "fallout." The contractor gave careful study to the most time-saving methods. Symons Steel-Plys proved to be one of the principal time-

savers. They were used on all major construction and were also adapted for pouring of large, reinforced concrete beams that were set between steel columns for blast protection.

Complete "Air Route Traffic Control Center" story sent free upon request. Symons Steel-Plys can be rented with purchase option.



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Warehouses Thruout the U.S.A.

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Construction Methods AND Equipment

MAY, 1960

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VOLUME 42

NUMBER 5

CONSTRUCTION METHODS AND EQUIPMENT, May 1960. Established in 1919. Published monthly by McGraw-Hill Publishing Co., Inc., James H. McGraw (1860-1948) Founder

Editorial, Executive, Circulation, and Advertising offices: McGraw-Hill Building, 330 W. 42nd St., New York 36, N. Y. Officers of the Publications Division: Nelson L. Bond, President; Shelton Fisher, Wallace F. Traendly, Senior Vice Presidents; John R. Callahan, Vice President and Editorial Director; Joseph H. Allen, Vice President and Director of Advertising Sales; A. R. Venezian, Vice President and Circulation Coordinator. Officers of the Corporation: Donald C. McGraw, President; Joseph A. Gerardi, Hugh J. Kelly, Harry L. Waddell, Executive Vice Presidents; L. Keith Goodrich, Vice President and Treasurer; John J. Cooke, Secretary.

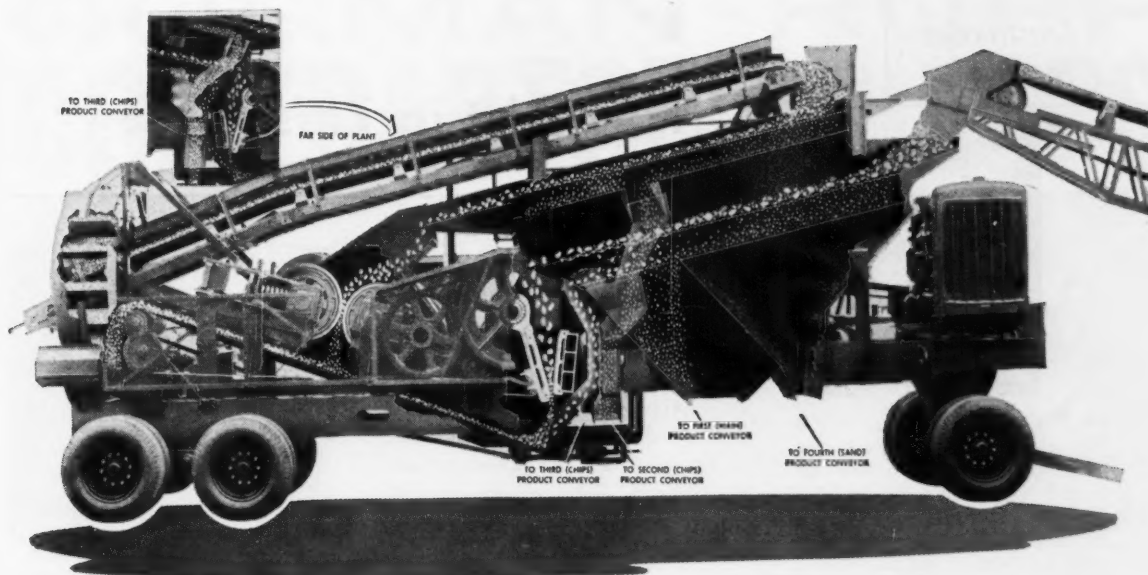
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What you should know about a Gravel Plant

As anyone at all familiar with producing aggregates from gravel knows, the output of a gravel plant is governed by a number of things, particularly:

- Size of plant and the pattern of flow through it.
- Hours of actual running time during the working day.
- Experience of operating personnel.
- The kind of source material, and amount of crushing.
- The specs you have to meet.

On any given job, you may get anywhere from 150 to 400 tons an hour with a big single-chassis portable plant . . . it all depends on conditions. Fantastic claims don't mean much to the

experienced operator. He knows it isn't the sudden spurt, but sustained week-after-week production that counts.

The experienced operator knows too, that to get consistently high production from not-so-good pits . . . production that will meet the specs for practically any job so that a fair profit can be realized . . . you have to have a really modern plant.

What's a modern plant today?

Well, we've learned there are seven advantages the good operator wants in his plant, if he's to consider it modern:

1. Ample crusher capacity, balanced between crushers, so he can tackle the high-percentage-crush jobs without loss of efficiency.
2. Ample scalping screen area to enable balanced crusher performance.
3. Ample sand rejection capacity to keep the produced material in line with tough specs when working "heavy sand" pits.
4. Adequate means of producing the required amount of 100% crushed material where specs so require.
5. Built-in provision for blending of multiple sizes to meet the middle requirements of his specs.
6. Provision for taking off several sizes simultaneously when several specs have to be produced at any given location, or for any one job.
7. The ability to do these things without costly shut-downs to change screens or make extensive crusher adjustments.

Contrary to claims, there is only one duplex crushing and screening plant on the market today that can meet all seven of these qualifications of a modern plant without extra equipment, or without considerable sacrifice in effi-

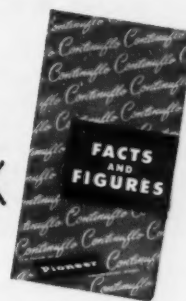
ciency of screen or crushers. This one exception is the "lower-deck-feed" Plant* built only by PIONEER, which utilizes four complete decks in the screen, as shown in the cutaway illustration. (That's because no other plant is designed for this purpose.)

For Complete Description and performance data for PIONEER Lower Deck Feed Plants (44 and 45 Series), see your nearest PIONEER Distributor.

He can show you how these performance proved gravel plants can help you submit lower bids to get the jobs . . . and at the same time, make a better profit!

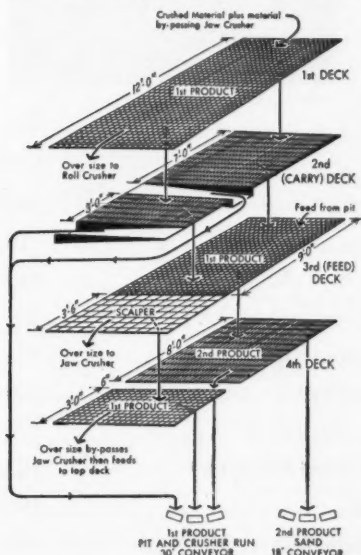
*Patented (Feed is on bottom specification size screen)

Free
Handbook



For your free copy of *Facts And Figures* (the most complete and comprehensive handbook for the aggregates-producing industry), write to PIONEER ENGINEERING, Minneapolis 14, Minnesota, or contact your Pioneer Distributor.

Pioneer
ENGINEERING
DIVISION OF POOR & COMPANY, INC.



Screening Arrangement for Standard Plant

Pay Dirt in This Issue



ON THE COVER

The relocation of U.S. Route 101 north of Brookings, Ore., calls for more than a million yards of grading per mile. Two cuts alone account for more than a million yards each. Morrison-Knudsen Co. is making them with five Euclid TS-24 twin-engine scrapers that work two 9-hr shifts 6 days per week. The machines work on steep grades—55% down on the loaded haul and 45% up on return. M-K's project manager, J. H. Coons, says this is the "roughest, toughest job on the Pacific Coast."

DEPARTMENTS

Construction News	
From Washington	13
Job Talk	19
Trends in the	
Machinery Market	45
Construction Business	50
Picture of the Month	65
Construction News in Pictures ..	67
Construction 'Round the World ..	83
Editorial	91
Construction Men in the News ..	219
Sales and Service	220
Construction Equipment News ..	226
New Publications	254
The Maintenance Shop	261
Methods Memo	266

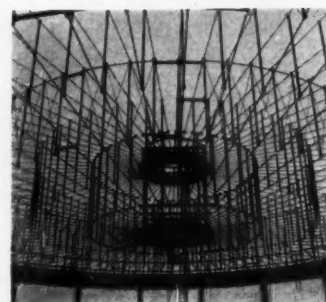
NEXT MONTH

Concrete barrel arches that hug the ground form the floor at Hillcrest Reservoir in Denver. To avoid intricate formwork on the job, the contractor prebuilt forms that can be raised into position for concreting, then lowered and rolled ahead for the next pour. The job also features imaginative falsework and roof forms.

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Complex Concrete Ring Supports Cable Roof ...96

To support a circular roof of suspended cables, a contractor in Utica, N. Y., had to figure out how to pour a 240-ft-dia irregular-shaped concrete ring 30 ft above the ground.



Confined Sites Don't Stop Tricky Bridge Builders ...115

Two contractors along Chicago's new Northwest Expressway are employing some unusual techniques to erect grade separation structures in several congested downtown areas.



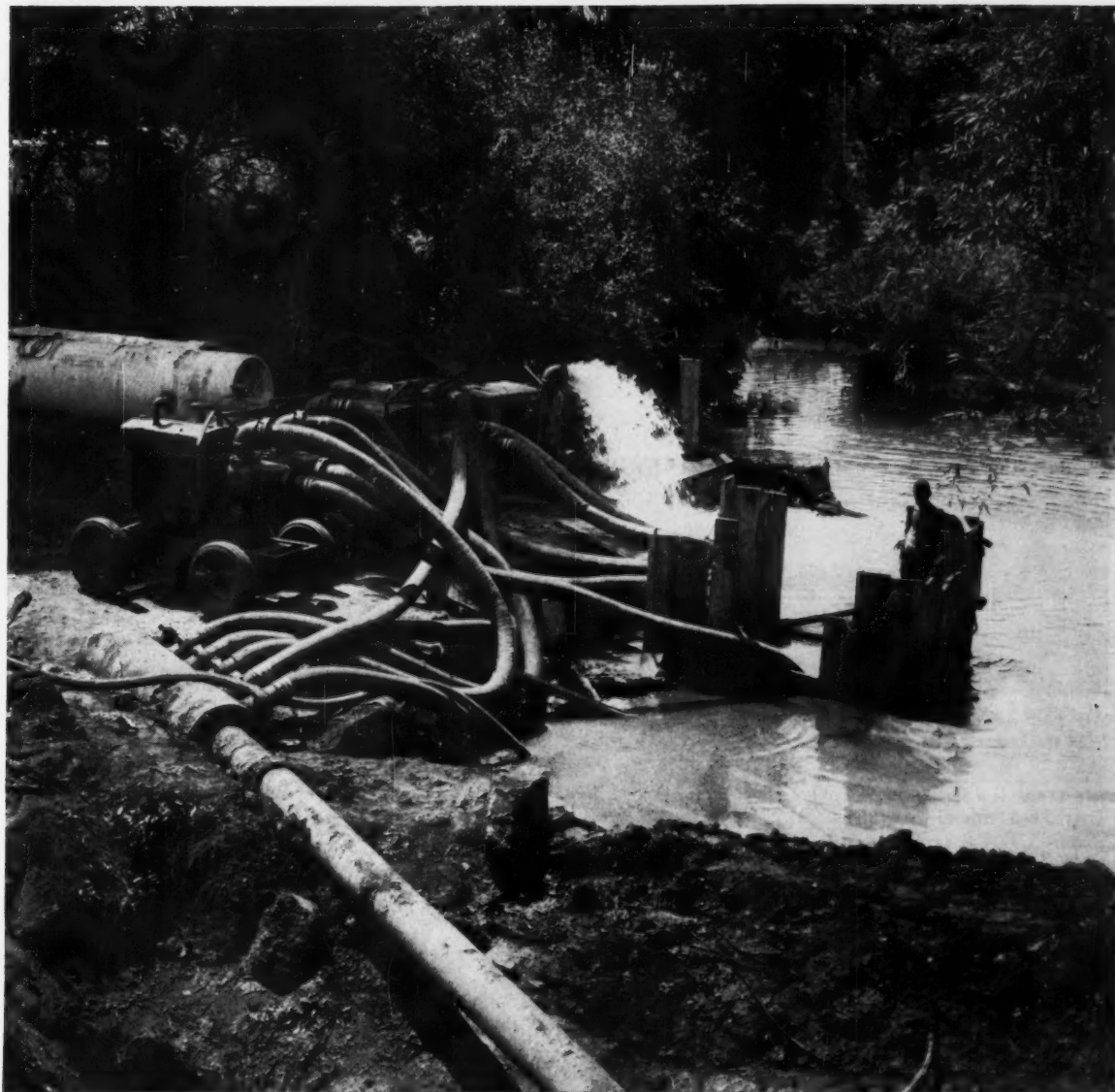
Backhoe Inside Shield Helps Dig Tunnel130

An interesting feature of the current East Boston Vehicular Tunnel job is a backhoe that Perini Corp. has mounted right inside the 31-ft dia shield to load muck onto a conveyor.



Drill-Driver and TV Keep Caisson Job Rolling	92
Blasting Compacts Sand Fill	101
Bid-Shopping Control Plan Highlights AGC Convention	105
Old Mixer Boat Has New Tricks	140
Plastic Balloon Encloses Buildings in Cold Weather	143
Frame Holds Tilt-Up Slab	151
Old Machine Parts Make New Mixing Rig	154
How to Set New Lights in Old Runways	160
Complex System Shores a Massive Building	171
Batch Truck Operation is Key to Paving Efficiency	183
Lift-Span Floats Into Place on Tide	186
EARTH COMPACTION—2. Reconnaissance, Materials, Tests	191

GORMAN-RUPP CONTRACTORS PUMPS



A battery of five Gorman-Rupp 90-M Pumps discharge into manifold, while a sixth, equipped with trash head, takes suction on a sanitary sewer line, discharging into stream. Dike in foreground.

1,000 hours at full throttle . . . no time out

How to dewater completely a stream flowing at considerably more than 400,000 GPH was the major problem for this contractor. The job was a sewer line installation at Mile Run Creek in New Brunswick, N. J. The surprisingly novel answer was to manifold five 6" pumps and work them at full tilt day and night. The pumps were Gorman-Rupp Model 16A2-IND30. The results: Six solid weeks of maximum performance with no pump off the line for more than a

few minutes maintenance, except one which was pumping again in less than three hours. When your needs are the most demanding, the *best* equipment is none too good. See Gorman-Rupp Pumps for Contractors at your nearby distributor.

THE GORMAN-RUPP COMPANY

305 Bowman Street • Mansfield, Ohio
GORMAN-RUPP OF CANADA, LTD., ST. THOMAS, ONTARIO



THE JOB was drilling 3" holes to 25' depth, in limestone so hard the insert carbide bits had to be reground after every 48' to 50' of drilling.

THE TEAM is a Jaeger "900" rotary compressor behind two Thor TR-5 air-and-hydraulic crawlers with 4 1/2" drifters.

FOOTAGE AVERAGED 2' per minute (1' per drill), the rate varying with the ledge strata.

A NOTABLE ECONOMY was in the fuel-saving, engine-saving speed of the compressor. *It maintained 100 psig at the drills without ever running faster than 1400 rpm.*

World's slowest running "900" compressor powers today's fast drilling team

JAEGER DELIVERS MORE AIR FROM SAME HORSEPOWER

Jaeger "900" uses the same GM 6-110 Diesel as other "900" compressors, but delivers its rated capacity at 100 rpm slower speed — 1700 instead of 1800. Its fuel factor is more than 500 cu. ft. of delivered air per pound of fuel consumed. The engine lives longer because it takes it easier throughout its operating life. Compressor life is longer, too. 8000 hours without a vane replacement is not unusual. Ask any Jaeger owner; ask your Jaeger distributor — or send for new Catalog JC-O.



Air-and-hydraulic drill adapts to any desired position. Drill and compressor make a self-powered mobile "team".

THE JAEGER MACHINE CO., 800 Dublin Ave., Columbus 16, Ohio

Jaeger Machine Co. of Canada, Ltd., St. Thomas, Ontario

PUMPS • MIXERS • TRUCK MIXERS • PAVING MACHINES

Make it a NORTHWEST—

THE statement is not an advertising headline. Check it on the job where Northwests are working. Experience that has generated this thinking is one of the things that has made one out of every three Northwests sold a repeat order.

Your Northwest is always ready to go. You'll hear it everywhere! Built to keep you out of trouble, Northwest design begins from the bottom up with the idea that real output can result only from continuous operation. Cast Alloy Steel Crawler and Rotating Bases for permanence and strength — alternate crawler widths and lengths to fit any type of job — High Speed Independent Boom Hoists — 3rd Drums — The Northwest Feather-Touch Clutch Control are just a part of the story. From Crawler to Boom Point there is an unbeatable combination of advantages all aimed at getting the job done. Before you buy your next machine, get the whole story from a Northwest man.

NORTHWEST ENGINEERING COMPANY

1503 Field Building • 135 South LaSalle Street
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*And get the
Job done!*



"THEY'RE
You can say... ALWAYS READY
TO GO!"

CRANES
SHOVELS
DRAGLINES
PULLSHOVELS
TRUCK CRANES

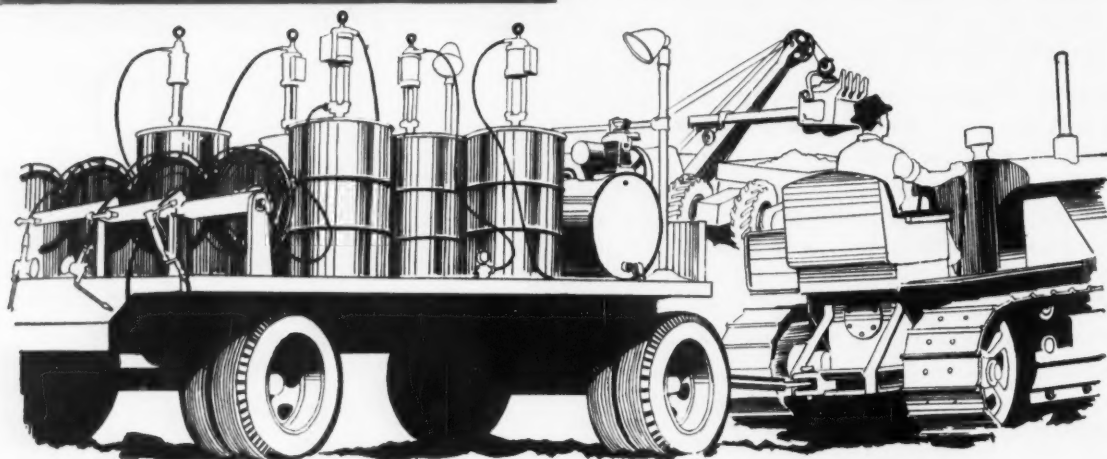
3/4 to 3 Cu. Yd.
Capacity

NORTHWEST



LUBE LOGIC

Tips for more



Do-it-yourself lube rig trailer

Maybe you're aware of all the advantages of a mobile lube rig, but just don't want to tie up a truck for this purpose. Or, perhaps you'd like a supplementary rig. You can solve either problem neatly by mounting your field lubricating equipment on a standard 5-ton farm trailer. That way, you can take your whole simplified lube plan out into the field where it's needed, without costly deadheading back to a fixed service point—and you can move the lube rig just by hitching

it to any truck, so it's just as mobile as a truck mounted rig at much less cost. And here's a bonus: by hitching your lube rig trailer to a bulldozer, you can take field service to spots that wouldn't be accessible to a regular truck.

Trailers for this purpose, as well as tanks and pumps, are all standard items you assemble yourself to meet your own requirements.

TEXACO LUBRICATION ENGINEERS ON THE JOB FROM COAST TO COAST



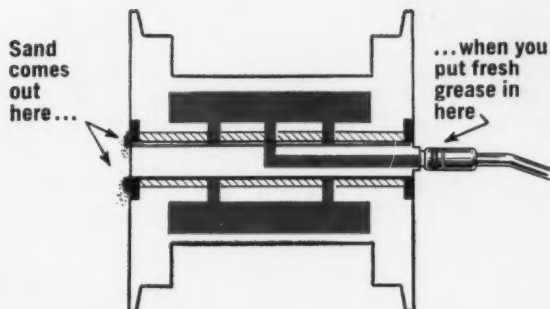
ROCKY REACH DAM AND POWERHOUSE on the Columbia River, Washington (above). W. N. Evans (left), Manager for Rocky Reach Contractors, discusses Simplified Lubrication Plan with E. S. Saunders, Texaco Contractor Sales Representative.

HOGBACK DAM, Riverton, Conn., (upper right) is part of the greater Hartford water supply system. Texaco man-on-the-job is H. F. Porter (left) shown with John Toffolan, Vice President, White Oak Contractors, Inc., General Contractors.

INTERSTATE HIGHWAY 80 PROJECT at Colfax, Iowa (right). Texaco Engineer E. A. Howles (right) works closely with Mott Construction Company on the important assignment of keeping equipment on the job and maintenance costs low.

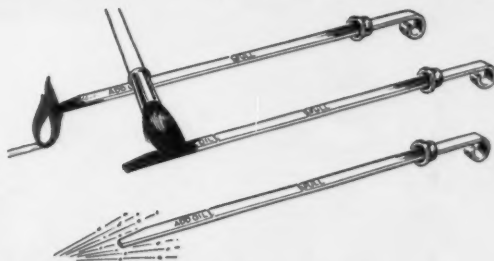


efficient maintenance



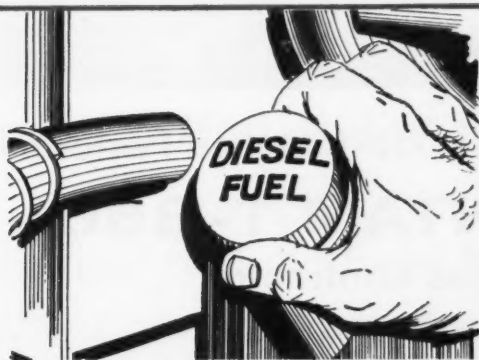
Track-roll enemy No. 1: sand

If you're operating a crawler-tractor in sandy soil, the best way to keep sand from getting into the track-roll bearings is to keep purging the bearings with fresh grease. Track-roll bearing seals are especially designed for this type of purge-lubrication, and the grease that comes out around the edges of the seal during lubrication carries the sand out with it.



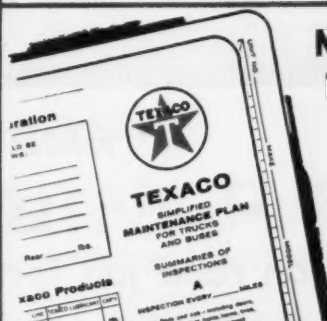
How to read dipsticks without squinting

The modern inhibited motor oil that keeps the inside of your engine clean also keeps the oil dipstick clean—and often too shiny to read. Here are three solutions for this problem—take your choice. 1. Heat the end of the dipstick so the metal darkens slightly. 2. Paint the end of the stick with a dull-finish cellulose lacquer. 3. Run the stick across the spark-plug cleaner to take off some of the shine. (If you use the spark plug cleaner, use the smallest rubber plug bushing and hold the dipstick over the hole with a wad of cloth to keep sand from scattering around the lube bay.)



Identify the fuel you want

Let one absent-minded maintenance man put gasoline in your diesel tank and as the fliers say "you'll be bailing out over Denver." It's happened. Best way to avoid its happening to you is to mark your fill cap "Diesel Fuel" or "Gasoline". Then nobody should make any mistakes.



NEW TRUCK RECORD FOLDER fits itself into your schedule

Texaco's flexible new truck record folder lets you stick to the lube schedule that works best for you without running into bookkeeping problems. Lubrication and oil schedules are completely separate from mechanical maintenance and replacement parts schedule—you don't have to follow any pre-established routine to use the folder profitably. And this new folder accounts for every single dollar you spend on truck maintenance for a whole year. Write for your folders today.



TEXACO LUBRICATION ENGINEERS

Every month we'll bring you a batch of "sleepers", little angles, so easy to overlook, where big savings in money and time can be made. But month in, month out, your local Texaco Lubrication Engineer is the best source of money-saving lubrication ideas. Don't forget that "Lubrication is a major factor in cost control."

Texaco Inc., 135 East 42nd Street, New York 17, N. Y.

Tune In: Texaco Huntley-Brinkley Report, Mon. Through Fri.-NBC-TV

TEXACO

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Canada • Latin America • West Africa





BANTAM's Job-Matched Performance *on rubber*... **BANTAM T-350** Takes over on road job for Texas contractor

Here's the busiest rig in the fleet of Central Construction Company, Dallas, Texas.

On a new county road relocation project, the BANTAM T-350 displayed its amazing work scope and versatility. Here is a sample of what it did:

- Excavated at creek site for new bridge • Excavated for concrete forming • Placed reinforcing steel • Set structural steel • Poured concrete • Did drainage grading

Why restrict your job range and income with a limited-purpose rig? BANTAM does so much more, earns you so much more. Only BANTAM in its class builds its own complete line of carriers—*four*—so you get perfectly matched performance between the upper and lower units, maximum stability and highest mobility.

Compare *all* the big-rig features that BANTAM gives you in a practical-size rig: capacity up to 11 tons . . . house-type or all-vision cab . . . three types of boom hoists to choose from . . . three transmissions, including torque converter . . . gasoline, diesel, LP-gas power . . . standard or optional deep-digging back hoe . . . anti-friction bearings in every major assembly for smooth, efficient power transmission.

And you take on more jobs, bigger jobs with BANTAM's 11 easy-change attachments. See your BANTAM distributor.

See why BANTAM is world's most popular rig of its size

The place to do it is at your nearby BANTAM distributor's. Get all the facts on this popular machine . . . arrange a demonstration. Get started toward greater profits now. Call him today.



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A BANTAM
DEMONSTRATION
TODAY!**

**See how you can profit more
from BANTAM's greater job range!
Mail the coupon for complete information**



Pays Off on More Jobs with More Profits

on crawlers... **BANTAM C-350**

Builds profitable business for Nebraska Contractor

Donald Hamar operates a successful excavating business—Hamar Construction Company. He ranges a good distance around South Sioux City, Nebraska.

This job, excavating and setting 8" and 12" iron pipe for a \$300,000 water treatment plant, required 6'- to 7'- deep trench. It also called for some nimble back-hoe performance—working tight against the plant at one point where BANTAM's practical size and responsive mechanical controls really speeded the job. The BANTAM C-350 then demonstrated its high-production back-hoe capabilities by trenching 900' for an overflow system on the same job.

For assignments like these, and scattered pipeline work which Hamar does, BANTAM has no equal. "BANTAM gives me the equipment to offer my customers the service they want and need. This rig is a real business-builder."

Now is the time to investigate BANTAM C-350—most

profitable producer in its class. Benefit from these BANTAM features: easier operation with foolproof mechanical controls . . . rugged crawler design with choice of standard or long crawlers . . . 2-speed, independent swing-travel-dump . . . in-cab digging lock . . . new optional long-boom back hoe for deep 18'10" digging.

BANTAM CR-350—popular, new self-propelled crane-excavator. 1-engine travel and work. Capacity to 11 tons. 4 x 4 drive optional.



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Bantam Co.

221 Park Street, Waverly, Iowa
World's largest producer of truck crane-excavators

CM-277-A

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Send catalogs on: ☐ T-350 ☐ C-350 ☐ CR-350

Name Position

Company Address

City Zone State

How protection in depth helps cut compensation costs



Improved safety can improve your competitive position

Every time a Liberty Mutual engineer spots a loose or missing guard rail or toe board, he may be helping you prevent a serious accident. This could mean a lowering of your compensation costs and the chance to cut your future job bids without cutting your margin of profit. Liberty engineers are specialists in all phases of construction safety, old hands at spotting hazards on the job. This safety engineering is but one of the many Liberty Mutual services that add up to protection in depth. To learn more about Liberty's protection in depth and how it can help lower your business insurance costs, get in touch with your nearest Liberty Mutual office.

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HOME OFFICE: BOSTON

...the company that stands by you

Business Insurance: Workmen's Compensation, Liability, Group Accident and Health, Fire, Fleet, Crime • Personal Insurance: Automobile, Fire, Inland Marine, Burglary, Homeowners

Construction News From Washington

Washington, D.C.
May, 1960

Congressional Highway Hearings

The hearings on highway "scandals" being held by Cong. John Blatnik's subcommittee have one purpose at this time: To establish to the satisfaction of Congress itself that a continuing investigation of the multi-billion-dollar highway construction program is needed.

Blatnik, a Democrat from Minnesota, has proved himself a successful crusader on other issues in the past. For instance, he bested the Eisenhower Administration in getting money appropriated for sewage treatment plants at a time when the President was vetoing many public works spending programs.

Blatnik's committee hired investigators and staffers from the McClellan Rackets Investigating Committee that was being disbanded. These are the people who have been digging into contracts and state supervision of highway construction in half a dozen states around the country.

With a couple of short hearings before Congress goes home this summer, Blatnik figures he can set it up so that he will have no difficulty getting enough money next year to keep a sizeable staff at work and a continuing schedule of hearings under way during the next Congress. This is, of course, on the assumption that the Democrats will win control of the House of Representatives again.

Plumbers Fight for Separate Contracts

Plumbing contractors are stepping up their drive to widen the use of separate contracts in place of single contracts for construction projects. The National Association of Plumbing Contractors recently issued a brochure designed to sell the separate-contract idea to public officials, architects, and engineers.

Another booklet now in the works will tell local plumbing groups how to promote state legislation stipulating separate contracts for state work. An attempt will be made to pass such laws in states like Connecticut, where the governor vetoed a similar bill last year.

Surprising progress has already been made in promoting separate contracts, according to an NAPC tabulation last month of new data from its state associations. Of 30 states that responded, six use separate contracts on all state work, while five more employ the separate-contract method on 90 to 98% of their projects. Nine others among the 30 do some part of their state work by separate contracts—up to 75% in two states.

State policy apparently sets the tone for county and local government work, which generally uses the separate-contract method to about the same extent as the state.

continued on next page

Dealers Stock Up on Grade-Marked Lumber

Grade-marked lumber has become generally available in yards throughout the United States during the last month. Areas that had depended largely on ungraded lumber shifted over to the new arrangement as dealers stocked grade-marked framing lumber and boards to meet an FHA requirement that took effect April 1.

FHA agreement to accept Canadian grade-marked lumber eased the changeover. For all practical purposes, current grade-marking standards of the nine major Canadian associations are equivalent to U. S. Standards. By Sept. 1, however, Canadian grade-marking must be done under uniform standards and supervisory controls corresponding to those of the American Lumber Standards Committee in the U. S. Commerce Dept.

Lumber producers and dealers generally regard the FHA order as a major step toward universal adoption of grade-marking. With few exceptions, they say that grade-marking means no increase in price for lumber of the same quality, and that it will give the small buyer the same protection previously enjoyed by the engineers, architects, and contractors who have insisted on grade-marked lumber for their projects.

Toll Road to Speed Interstate Link

Maryland and Delaware are seriously considering toll-road financing to hasten construction of a badly needed 60-mile expressway connection (Interstate Route 95) between Baltimore and the Delaware River Memorial Bridge. Cutbacks in federal-aid allocations will delay construction until 1968-70 if the two states wait for normal 90% interstate assistance to build a toll-free road. Revenue-bond financing would permit a start on the \$100-million construction job early next year, with completion by 1963.

MC&S Loses on Wage Issue

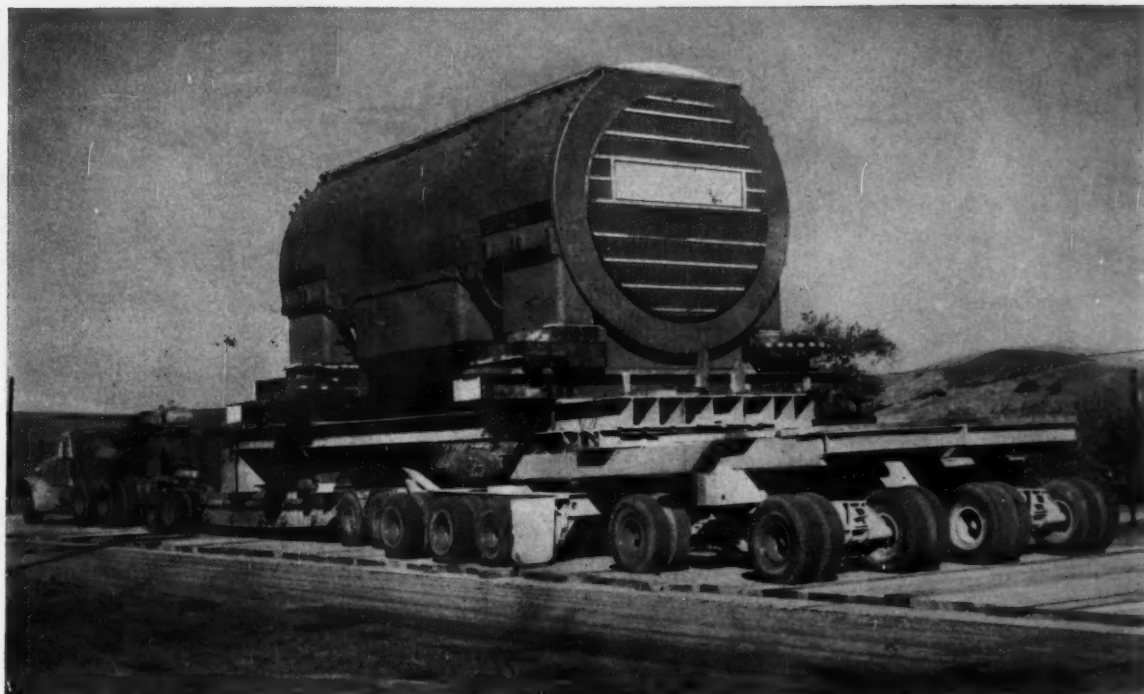
Comptroller-General Joseph Campbell has acted as a judge on a tough construction issue that arose at the Glen Canyon Dam on the Colorado River.

After much negotiation and a months-long strike last year, Merritt-Chapman & Scott Corp., the prime contractor, signed an agreement with the construction trades calling for payments above the hourly scale negotiated by the Arizona contractors. But the MC&S contract with the unions does not call for the subsistence payments or travel pay for work at a site distant from specified "free" cities, as the basic state agreement provides.

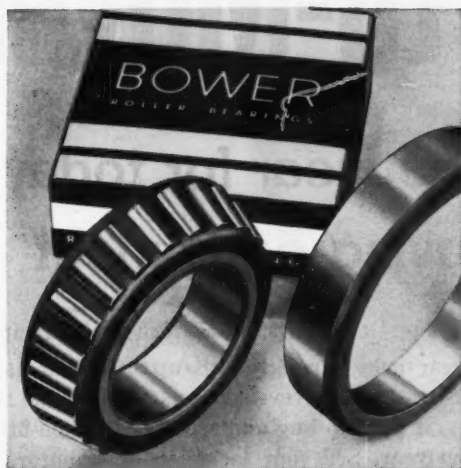
The General Accounting Office ruled that MC&S would have to absorb the additional labor cost—that the above-scale hourly wage the company agreed to is, in fact, a subsistence payment by another name. It also said that the Bureau of Reclamation, by the terms of its contract, need not pay 85% of the wage increase, as it is required to pay if, in fact, a wage payment is involved.

Said the GAO: The payment remains a subsistence or travel allowance, even though it's called a wage rate.

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Giant loads that require planking of the paved highways to preserve them need the most dependable bearings that money can buy. That's why so many big equipment makers and maintenance superintendents specify Bower roller bearings. Extra-large flanges, larger oil grooves and shoulder-radius design combine to help cut friction so bearings deliver high-tonnage service with longer life. *Higher flanges* give rollers larger "2-zone" contact areas which cut unit pressure on each roll . . . improve alignment, reducing wear and end play. *Larger oil grooves* insure positive roller-head lubrication. *Shoulder radius* assists the oil groove in maintaining an unbroken film of lubricant on roller heads. All these add to the "plus value" of Bower bearings.

The Bearing Specialist who handles the Bower line stocks both tapered or straight roller bearings. He can give you fast replacement service on each. Call him!

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DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 13, MICHIGAN





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With Goodyear Earth-Mover Rims you enjoy such additional benefits as a heavy-duty bead seat band driver—to prevent slipping under severest operating conditions. And you get the positive air seal

provided by Goodyear's famous Tru-Seal principle.

Goodyear makes rims in widths up to 37" and diameters up to 49". To prevent premature tire and rim failure, it pays to buy and specify rims job-fitted by Goodyear. See your local rim distributor, or write: Goodyear, Metal Products Division, Akron 16, Ohio.

Send for Free Goodyear Rim Catalog

—84 pages of facts and pictures on Goodyear's complete line of rims for every type of vehicle.



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Rim

Only Goodyear Rims
have Bond-A-Coat Finish,
for lasting protection
against rust and corrosion.



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May 1960—CONSTRUCTION METHODS and Equipment—Page 17



First man on the job— after your Travelers agent

Call your Travelers man while your new construction is still a castle in the air. The Travelers umbrella of protection offers more than complete insurance coverage. It includes the services of experts who can help you secure your job against costly accidents and delays.

Bonds, fast and right: Your Travelers man is an expert on requirements—federal, state and local—gets bonds to responsible contractors *fast*.

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Builders' Risk Insurance and Contractors' Equipment Floaters are backed by a claims organization that can give you prompt attention anywhere in the United States.

For *complete* protection and expert service that help you fulfill your commitments on time—with increased safety—call your Travelers Agent when you *start* to plan. His number is in the Yellow Pages of your phone book.

THE TRAVELERS

Insurance Companies HARTFORD 15, CONN.

Job Talk...



Folded Plate Plywood Units Span 50 Ft

A new structural building component made of thin sheets of plywood glued to light lumber stringers to form a series of troughs takes advantage of the folded plate idea to span up to 50 ft. The material combines both framing and deck. It can be used either as removable concrete forming or as a permanent part of the pour.

Tested in more than 500 buildings in Canada and Great Britain, Trofdek will be fabricated and sold in this country by subscribers of Plywood Fabricators Service, Inc., an affiliate of the Douglas Fir Plywood Association. The units are capable of carrying up to 100 times their own weight.

And they are lightweight—two men can easily handle a standard 100-sq-ft panel.

The troughs run parallel to the span and vary in depth from $5\frac{3}{4}$ to $15\frac{1}{2}$ in. Distance between troughs is 16 in. Reinforcing steel may be placed directly in the troughs with no fear of eventual exposure when the plywood components are left in place permanently after serving as formwork.

The picture above shows a crew pouring a folded plate roof slab for a warehouse at Ville St. Laurent, Quebec, where the contractor used more than 28,000 sq ft of Trofdek in two applications to form the roof.

Screed Finishes Highway Slab

On a section of highway near St. Augustine, Fla., the James H. Cragg Construction Co. had to pour slabs on an old lake bed that, because of soil conditions, could not be compacted to support the slab. Instead the concrete had to be placed on top of piles.

Heavy road machinery could not be used, so Cragg raked the concrete to the approximate height of the forms and struck it off with a 34-ft Stow vibrating screed. Supported by rollers at each end, the screed vibrated the freshly placed concrete as it struck it off smoothly. The screed features an adjustable crown device in the center and is equipped with two power packs.

continued on page 23

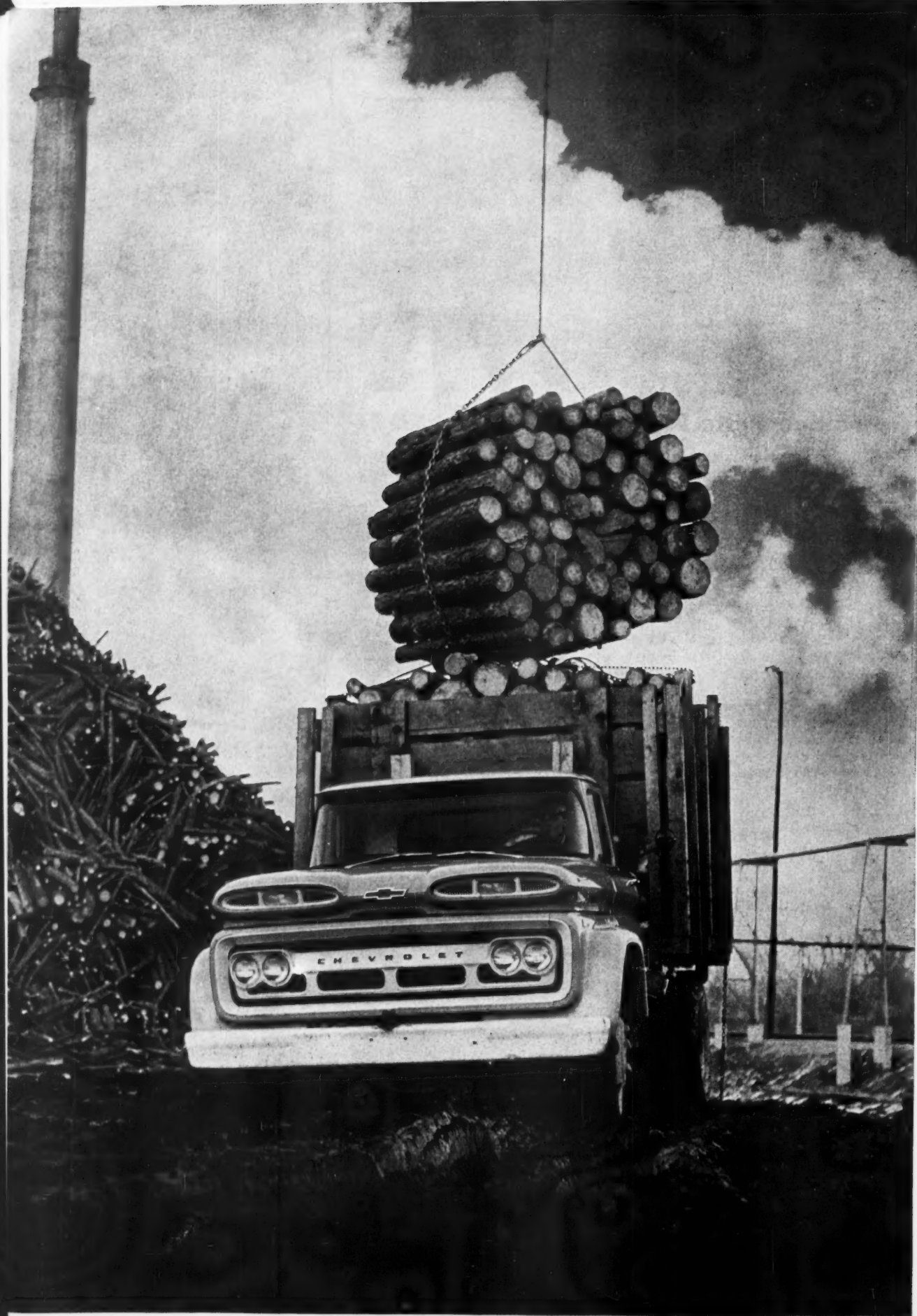


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ONE SOURCE. Unlike most insurance companies, you'll find The Travelers writes all kinds of business insurance: group, automobile, boiler and machinery, business life insurance, crime insurance... everything you need.

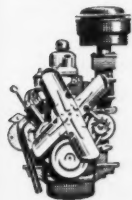
ONE MAN TO SEE. You can handle all your insurance matters with one man, your friendly Travelers Agent or broker. Because he sees the entire picture, he naturally can serve you and all your insurance needs better.

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"WE CAN AVERAGE AN EXTRA LOAD A DAY... MAKE \$45 TO \$50 A DAY MORE WITH THIS CHEVY THAN WE CAN WITH THE OTHERS."

That 60 Series middleweight you see works for J. E. Fox, North Carolina logging contractor. Bobby Fox, a partner in the business, will tell you how much more money a Chevy can make. And how much more it can *save* with its big Jobmaster 6 engine getting as much as 14.8 miles to the gallon. That's just one of the reasons the Foxes wouldn't drive anything but a Chevrolet into the woods. "We hit stumps and potholes you'd think would tear a truck to pieces, but it doesn't hurt our Chevy. The cab is tight, the truck brakes like an automobile, and we're getting extra good tire life. As far as I'm concerned," Bobby Fox adds, "it's the only truck for this kind of work."



■ Get a 6-cylinder engine that can handle big-tonnage loads and you've got your overhead down where it's no bother at all.

That's the reason you see the big 261-cu.-in. Jobmaster 6 in so many hard-working middleweight Chevrolets. This engine's been building up a reputation over the years as the workhorse of the industry. Its valve-in-head design is dedicated to dependability. Built to turn out an efficient 150 horsepower (with a high 8.0 to 1 compression ratio) and get the most out of every gallon of gas while serving up plenty of load-pulling power.

As Bobby Fox describes it, "That 6-cylinder engine really performs. It's got the lugging power we need in the woods and walks right along with a full load on the highway."

The thing to do is drop in on your dealer and check the Jobmaster specs in detail. At the same time you can get the dope on Chevy's *new* work-saving Powermatic transmission. It's now available in Series 60 through 80 models. Talk engines, models, capacities, everything. Just be sure to save some time for a trial run in a '60 Chevy. Honest to gosh, you've never in your life driven a truck like this one. You'll see why drivers are praising it to the sky. You'll see why cargo damage is a pain of the past. You'll see why so many Chevy truck operators are able to get more work done in a day. And why the trucks are able to go thousands of more miles before trade-in time. Make it soon. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.



1960 CHEVROLET STURDI-BILT TRUCKS



**THERE'S A
REASON WHY IN
WHYTE
STRAND
SHOVEL
ROPES!**

For your construction operation, there are many reasons why Whyte Strand is the best wire rope you can use on your shovels. Here are just a few:

- Every foot of wire in Whyte Strand is specially drawn by Macwhyte in their own wire mill.
- Product engineers determine the exact makeup of each rope to assure correct size, strength, and flexibility to meet your requirements.
- Special Macwhyte lubricants are used in accordance with the needs of the equipment or the type of service in which the rope will be used.
- Entire wire and rope mill operations are concentrated on the making of one product . . . *wire rope!*

But the proof of the pudding is in the using — and here's where Whyte Strand shines. You can spend all kinds of money, but you can't buy a better rope for your shovels than Whyte Strand . . . nor one that will give better service, with less trouble.

Whyte Strand shovel ropes are made in two strengths — Monarch Whyte Strand Improved Plow Steel and PREMIUM Whyte Strand Extra Improved Plow Steel — both are listed in bulletin No. 6025.

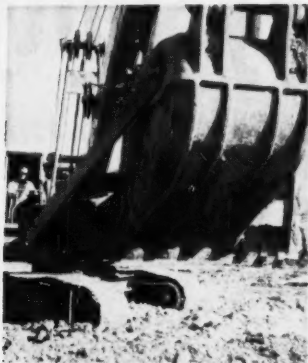
Ask for this new bulletin which gives complete listings of all Whyte Strand wire rope.

213-A

MACWHYTE *Wire Rope* **COMPANY**

2900 Fourteenth Avenue, Kenosha, Wisconsin, U. S. A.

Wire Rope • Slings • Cable Assemblies



Wings on Bucket Double Width of Ditch

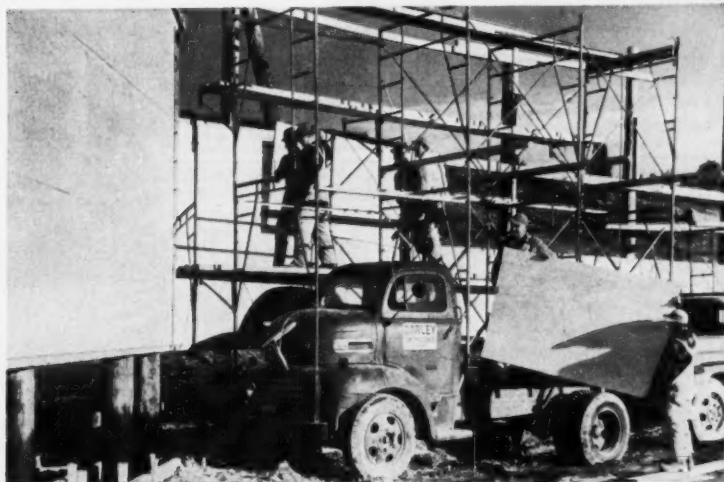
Steel plate wings welded to the sides of a backhoe bucket enable it to dig ditches twice as wide as usual.

B. L. English Construction Co. of Houston, Tex., rigged up the bucket for a drainage contract on the North Expressway near Houston that called for several short sections of 90-in.-wide trench. Moving in a ditching machine for the relatively short sections of trench involved would have been impractical.

The wings consist of 1-in.-thick steel plate 14 in. high. They are braced by 1x6-in. plates welded to the ends of the wings and bolt-

ed to the rear of the bucket. The wings increase bucket width from 45 in. to 91 in. The device ups the capacity of the 1-yd Amsco bucket to about 2 yd, but the operator seldom fills it to prevent overtaxing the Insley hoe that wields it.

To change the width of the trench, English merely cuts off some of the wing plates with a torch, saving the pieces so they can be welded back on later if desired. With the wings thus reduced, English's rig dug a 60-in.-wide ditch 17 to 19 ft deep and about 365 ft long in just 9 hr, in spite of hard digging.



Scaffolds on Trucks Help Fence In Park

Getting an outfield fence up in time to make a target for batters opening the baseball season in Tacoma's new park was the problem facing Earley Construction Co. The Tacoma contractor hit on an idea that was good for ex-

tra bases when they put steel scaffolding on top of a formerly discarded truck to hold workmen installing the timber-framed plywood-faced wall.

Pockets welded to the frame of

continued on page 29

LOADS IN 3 MINUTES, yet HANDLES LOW-BED SIZE RIGS!

MILLER "OTS" 22 TON TILT-TOP

Complete with platform, tires, two pairs of air brakes, three hydraulic tilt cylinders, lights, reflectors and turn signals . . . tax included.

\$4493.50 F.O.B. Milwaukee, Wis.



22 TON CAPACITY FOR HAULING

D8 crawler tractor
Model 170 crane
Insley International-H TD-24 crawler tractor
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Caterpillar

Bay City



Most of the heavy rigs you use . . . can be handled easier with less man hours lost in loading on this big new gooseneck Tilt-Top. You save the extra labor cost of detaching platforms from cumbersome low-beds . . . gain Tilt-Top drive on-drive off, loading speed. Standard tilt platform section is 8' x 16' or 20' if desired. Stationary section is 4 1/2' x 8'. See it at your MILLER distributor now!

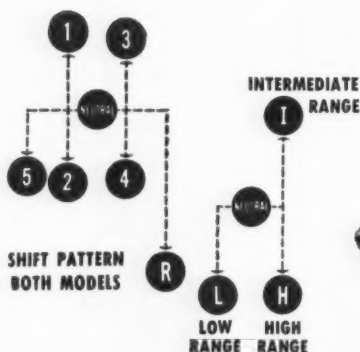
...and just **ONE MAN** drives on to load

Miller
Tilt-Top Trailer Inc.

457-J S. 92nd St., Milwaukee 14, Wis.

NEW Heavy-Duty

10 closely-spaced gear splits plus deep reduction ratios



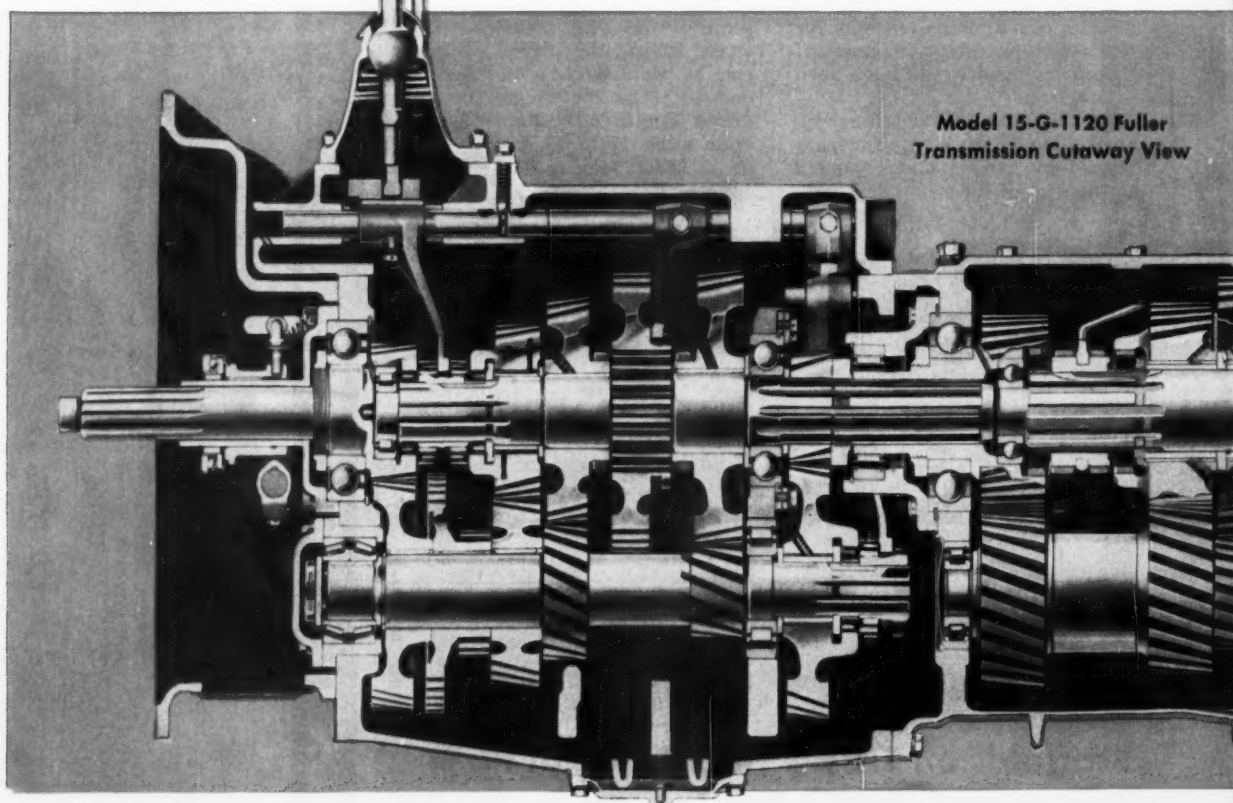
MODEL 15-G-1120

MODEL 15-H-1120

Fuller now offers two new 15-speed transmissions engineered for on and off-highway diesel truck operations demanding high capacity, long wear life and ease of operation . . . for logging, mining, construction, oil-

field work, aggregates and ready-mix. Advantages of the new transmissions include:

1. Extremely short installation dimension, which permits shorter wheelbase for tractors which formerly incorporated main and auxiliary transmissions.
2. Maximum operational flexibility with not only 10 closely-spaced gear splits, but also 5 speeds avail-



Model 15-G-1120 Fuller
Transmission Cutaway View

FULLER

TRANSMISSION DIVISION
MANUFACTURING COMPANY
KALAMAZOO, MICHIGAN

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Automotive Products Company, Ltd., Automotive House, Great Portland Street, London W.1, England, European Representatives

15-SPEED TRANSMISSIONS

designed for combination on and off-highway applications

able for low range operation through a deep reduction in the auxiliary.

3. A wide choice of optional gear ratios to match every job requirement.

4. Weight reduction obtained by eliminating support brackets, joints, cross members and a propeller shaft.

For full details on the Fuller 15-G-1120 and 15-H-1120 Transmissions, ask your dealer or write Fuller Manufacturing Company.

Model 15-G-1120: Standard Gear Ratios

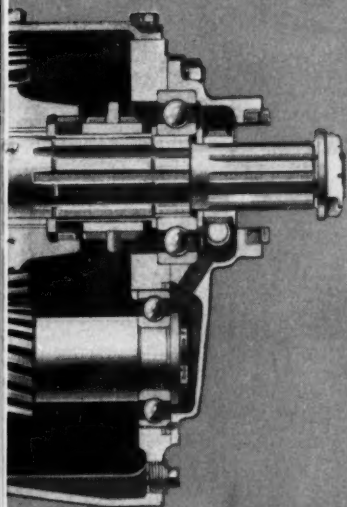
SPLITS—OVER-HIGHWAY				LOW RANGE—OFF-HIGHWAY		
Speed	Split	Ratio	% Step	Speed	Ratio	% Step
10th	O'Drive-High	.636	33	5th-Low	1.33	
9th	O'Drive-Int.	.844	19			57
8th	Direct-High	1.00	33	4th-Low	2.09	
7th	Direct-Int.	1.327	32			76
6th	3rd-High	1.76	33	3rd-Low	3.68	
5th	3rd-Int.	2.32	41			86
4th	2nd-High	3.27	33	2nd-Low	6.83	
3rd	2nd-Int.	4.33	51			100
2nd	1st-High	6.54	33	1st-Low	13.67	
1st	1st-Int.	8.68				

Model 15-H-1120: Standard Gear Ratios

SPLITS—OVER-HIGHWAY				LOW RANGE—OFF-HIGHWAY		
Speed	Split	Ratio	% Step	Speed	Ratio	% Step
10th	O'Drive-High	.636	33	5th-Low	1.68	
9th	O'Drive-Int.	.844	19			57
8th	Direct-High	1.00	33	4th-Low	2.64	
7th	Direct-Int.	1.327	32			76
6th	3rd-High	1.76	33	3rd-Low	4.65	
5th	3rd-Int.	2.32	41			86
4th	2nd-High	3.27	33	2nd-Low	8.63	
3rd	2nd-Int.	4.33	51			100
2nd	1st-High	6.54	33	1st-Low	17.27	
1st	1st-Int.	8.68				

Optional Gear Ratios: Models 15-G-1120, 15-H-1120

Overdrive: .85, optional at extra cost
Overdrive: .74
Reverse: 5.06



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LIKE A LOADER WITH EXTRA REACH?

The TL-20 has it! Means fast, even dumping into high-sided trucks—no wasting time leveling material to distribute it evenly.

That extra foot or two of reach that you get with a TL-20 tractor loader makes a big difference in your output. You clip valuable seconds from work cycles by dumping loads right into the center of high-body trucks. No time-consuming loading from both sides . . . no pitching . . . no wasting time dozing to distribute material evenly—and no banging up truck and loader.

Other exclusive advantages include: *Faster Shifting*—one lever controls both forward-reverse and all speeds. *Greater Stability*—easier loading, less spillage, more operator comfort. *Strong, Pin-Connected Axles* prevent rolling and shifting of axles under load. Your Allis-Chalmers dealer can show you other tractor loader advantages that bring extra production on excavating and loading work. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

TL-20—6 buckets, from 2¼ to 5 cu yd • 130-hp diesel • 23,250 lb • 9,000-lb. carry capacity



move ahead with
ALLIS-CHALMERS
power for a growing world





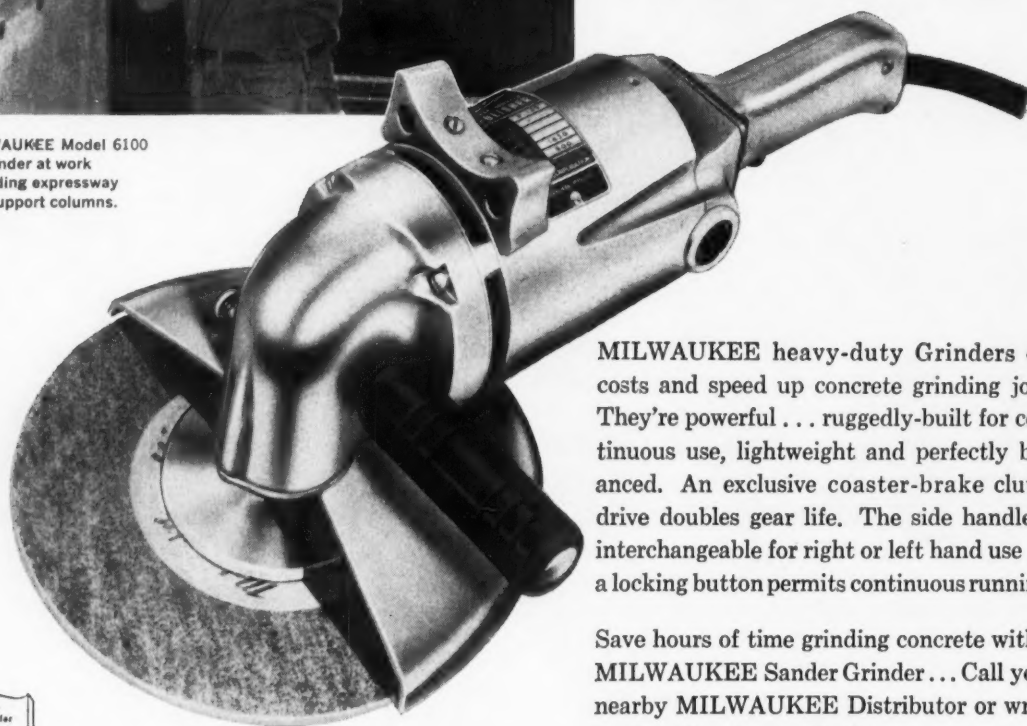


A 9" MILWAUKEE Model 6100 Sander-Grinder at work finish-grinding expressway concrete support columns.

**FAST,
LOW-COST
WAY TO
GRIND
CONCRETE**



**HEAVY-DUTY
SANDER-GRINDER**



MILWAUKEE heavy-duty Grinders cut costs and speed up concrete grinding jobs. They're powerful . . . ruggedly-built for continuous use, lightweight and perfectly balanced. An exclusive coaster-brake clutch drive doubles gear life. The side handle is interchangeable for right or left hand use . . . a locking button permits continuous running.

Save hours of time grinding concrete with a MILWAUKEE Sander Grinder . . . Call your nearby MILWAUKEE Distributor or write for free literature and prices.



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A9-8020

MILWAUKEE ELECTRIC TOOL CORP., 5322 W. STATE ST., MILWAUKEE, WIS.

JOB TALK . . .

continued from page 23

the truck hold the base of the scaffold legs. Platforms placed at convenient heights on the scaffolding hold workmen within easy reach of the fence. A small gas-powered generator, also attached to the truck frame, supplies current to operate electric tools.

Nearly 13,000 sq ft of $\frac{3}{4}$ -in. exterior type plywood will cover the timber frame of the fence, which varies in height from 16 to 32 ft. Posts spaced at 10-ft centers and held at the base by either concrete or tamped back-fill carry 20-ft-long 3x8 stringers spaced at 4-ft vertical intervals.

Galvanized 7-in. spikes driven into pre-drilled holes secure the stringers to the posts. Crews edge-nail the plywood sheets to the stringers with galvanized box nails. Two PlyClips at each panel joint eliminate cross-blocking.

Earley wound up using two scaffold supporting trucks on the job. Strips of metal mat laid under the wheels helped keep the rigs on an even keel in deep mud.



Ladder Makes Safe Mount

A safety ladder made of strap steel and scrap reinforcing rods gives this crane operator a boost in mounting to the cab of his rig.

Chicago contractor John Doherty Co. devised the ladder for a Bucyrus-Erie 38-B that lifts muck cars from a tunnel shaft and lowers ribs and lagging. Tied down to one spot at the top of the shaft, the crane is stationary for long periods of time. A railing made of reinforcing bars at each side of the ladder helps by giving the operator a hand-hold while mounting or dismounting.

BUILT-IN RUST PROTECTION



Blue Brute Air Tools give you a big money-saving feature—they resist rust and corrosion. The reason is an exclusive process: Blu-Coated Parts.

With Blu-Coated Parts Worthington Air Tools operate better job after job and in damp atmosphere. They resist wear, seizing, galling. They hold oil better. Even after your toughest jobs you can store them for months without deterioration.

Blu-Coated and Worthington Distributor's Guaranteed Availability Plan keep your jobs going even if your tools are in for checkup or repair. GAP works this way: 1) bring in your Blue Brute tool for repair. While it's in distributor's hands he will, 2) lend you an air tool to keep your job going. See him for complete details, about Blu-Coated, GAP, and assured parts and replacements. 60-15



You buy this premium STRENGTH shovel well below premium price

• You can pay \$12 a dozen more, but you can't buy as much shovel as you get in RAZOR-BACK.

• It's the only shovel forged with a thicker (13 gauge) center all the way down to the cutting edge, where other shovels wear out fast. Sides taper to 17 gauge to lighten weight.

• Socket is 11 inches — 2 inches longer than others. Handle is guaranteed highest strength ash, not weakened by chucking

at the top of the socket. Shovel is center balanced, clean scouring. Order from your equipment supplier.

RAZOR-BACK

THE UNION FORK & HOE COMPANY
Columbus 15, Ohio

Asphalt and Road Rakes, Concrete Spades, Mortar Hoes, Weed Cutters, Stone Hooks

If you use rear-dump haulers

Backed by better than 25 years of specialized experience in building off-highway earthmoving equipment exclusively, Euclid's modern rear-dump line incorporates advanced engineering that is a result of unmatched field experience. From the 10-ton Model R-10 to the big 55-ton "Euc" with two engines and a total of 672 h.p., Euclid Rear-Dumps are job proved to meet today's requirements for big performance. This greater dimension... in range of capacities, in choice of engines, transmissions and tire sizes, and in type of hauler... and in parts and service facilities of a world-wide dealer organization, too... can mean lower hauling costs and more work-ability on every one of your rear-dump jobs.

Have the Euclid dealer in your area give you facts and figures to compare with your own hauling costs... you'll find Euclid's greater dimension pays off in a better return on your investment. EUCLID Division of General Motors • Cleveland 17, Ohio

Payload capacities of 10, 15, 18, 22, 27, 40 and 55 tons... also semi-trailer models of 12, 22, 35 and 50 ton capacity.



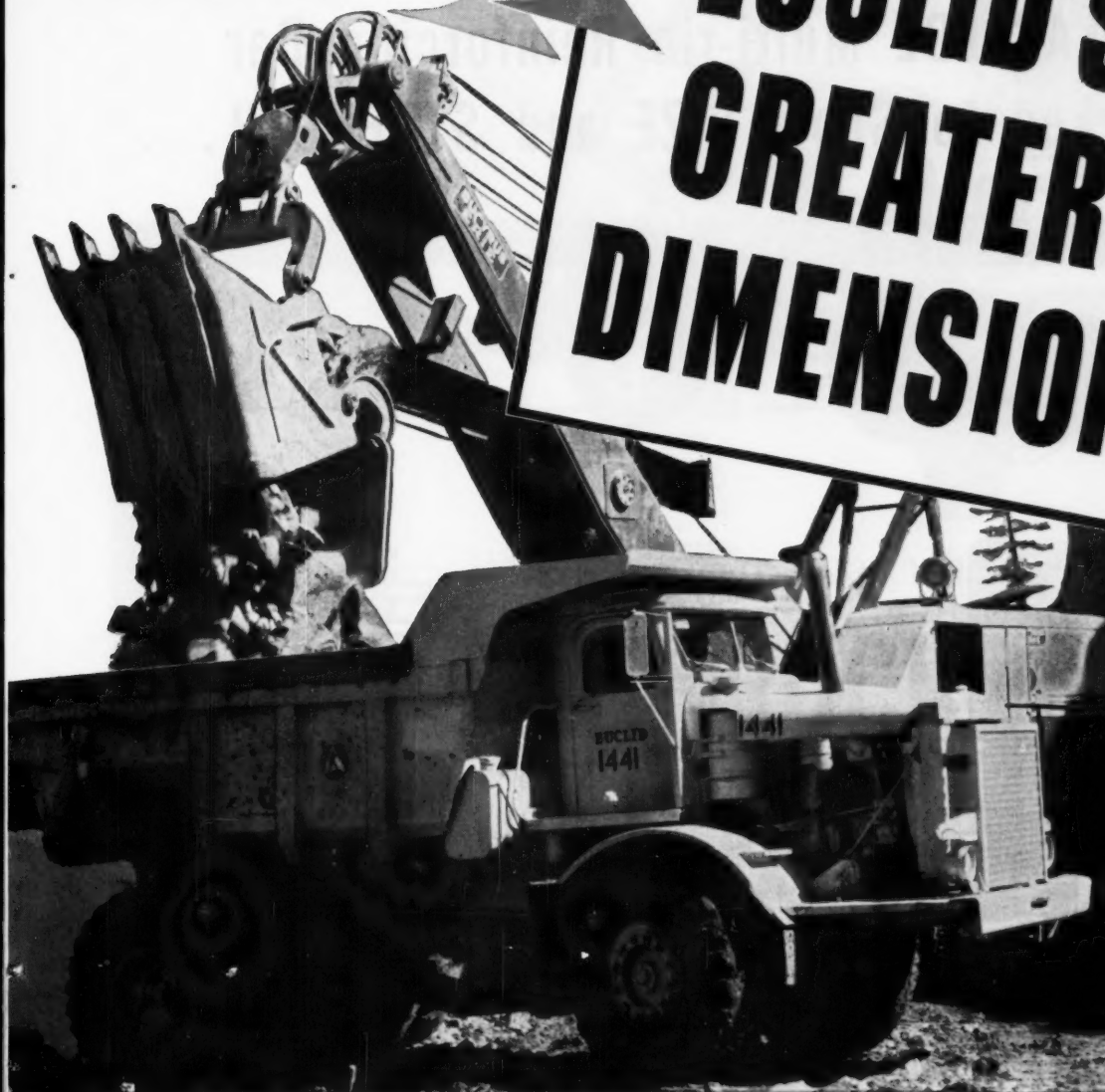
When you compare Rear-Dump Haulers, check these 7 points...

- is maker experienced in the field... known for building a dependable, well-engineered product?
- are maintenance manuals, parts books and service literature complete... is machine designed for easy servicing?
- does machine have required performance ability needed... capacity and speed for high production work, power and traction for rough going and steep grades?
- is machine easy to operate... convenient controls... good visibility... operator comfortable so that efficiency is maintained for entire shift?
- well-balanced for size of loading equipment... hoppers and controlled dumping needs?
- can required production be maintained at low cost... construction rugged enough to withstand heavy service with minimum maintenance?
- is there good parts and service availability... at both manufacturer and dealer level?

Euclid Rear-Dumps meet every one of these important requirements... and more!

...check

EUCLID'S GREATER DIMENSION



Vestpocket guide to Cummins power!

If you use rear-dump haulers

Backed by better than 25 years of specialized experience in building off-highway earthmoving equipment exclusively, Euclid's modern rear-dump line incorporates advanced engineering that is a result of unmatched field experience. From the 10-ton Model R-10 to the big 55-ton "Euc" with two engines and a total of 672 h.p., Euclid Rear-Dumps are job proved to meet today's requirements for big performance. This greater dimension... in range of capacities, in choice of engines, transmissions and tire sizes, and in type of hauler... and in parts and service facilities of a world-wide dealer organization, too... can mean lower hauling costs and more work-ability on every one of your rear-dump jobs.

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**Payload capacities of 10, 15, 18, 22, 27, 40 and 55 tons...
also semi-trailer models of 12, 22, 35 and 50 ton capacity.**

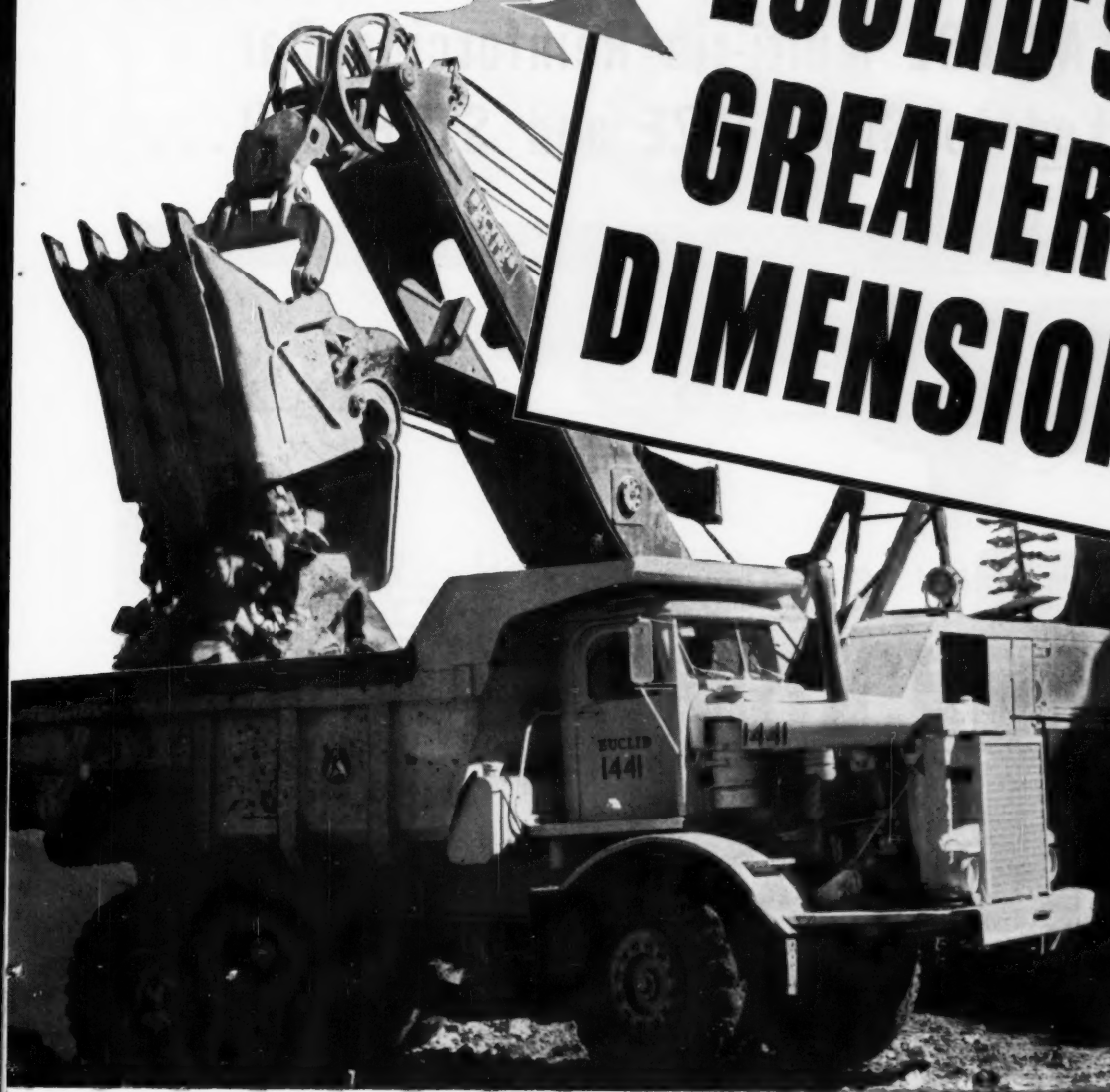


CUMMINS CONSTRUCTION DIESELS

Engine Model	H.P. @	R.P.M.	Engine Model	H.P. @	R.P.M.
J-70-BI	70	2000	NH-180-BI	180	2100
J-80-BI	80	2500	HRF-6-BI	190	2000
J-90-BI	90	2000	NH-195-BI	195	2100
J-6-BI	100	1800	NT-200-BI	200	2100
C-105-BI	105	2500	HS-6-BI	210	1800
JF-6-BI	110	2200	NH-220-BI	220	2100
HR-4-BI	115	1800	HRS-6-BI	240	1800
HRC-4-BI	115	1800	NT-6-BI	250	2100
JN-130-BI	130	2500	NTO-6-BI	262	2100
NHC-4-BI	130	2000	L-6-BI	265	1000
JS-6-BI	160	2500	NHS-6-BI	290	2100
H-6-BI	160	1800	NRT-6-BI	300	2100
C-160-BI	160	2500	LR-6-BI	320	1100
NT-165-BI	165	1800	NHRS-6-BI	320	2100
JNS-6-BI	175	2500	NRT0-6-BI	335	2100
JT-6-BI	175	2500	NFT-6-BI	375	2300
C-175-BI	175	2500	LRT-6-BI	450	1100
HR-6-BI	175	1800	NVH-12-BI	450	2100
NT-180-BI	180	2100	VT-12-BI	600	2100

...check

EUCLID'S GREATER DIMENSION



SCRAPERS

MANUFACTURER	CAPACITY OR TYPE	CUMMINS DIESEL	MANUFACTURER	CAPACITY OR TYPE	CUMMINS DIESEL
Clark (Michigan)	10½ to 27 yd.	175 to 335 h.p.	R. G. LeTourneau	Tandem Scraper	335 to 1200 h.p.
Curtiss Wright	21 to 27 yd.	240 to 300 h.p.	LeTourneau- Westinghouse	Tractor Scrapers, 9 to 27 yd.	130 to 335 h.p.
Euclid	18 to 24 yd.	300 to 335 h.p.	M-R-S	25 to 48 yd.	220 to 600 h.p.
International Harvester	16 to 21 yd.	175 to 262 h.p.	Wagner	5.7 to 25 yd.	110 to 290 h.p.
			Westfall	12 to 26 yd.	130 to 335 h.p.

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**Payload capacities of 10, 15, 18, 22, 27, 40 and 55 tons...
also semi-trailer models of 12, 22, 35 and 50 ton capacity.**



CRANES

MANUFACTURER	CAPACITY OR TYPE	CUMMINS DIESEL	MANUFACTURER	CAPACITY OR TYPE	CUMMINS DIESEL
American	30 to 40 ton	115 to 160 h.p.	Northwest	15 ton	160 h.p.
Baldwin-Lima	30 to 100 ton	220 to 335 h.p.	P & H	40 to 100 ton	290 to 600 h.p.
Bay City	25 to 30 ton	115 to 175 h.p.	Unit	15 ton	100 h.p.
Insley	15 ton	160 h.p.			
Koehring	Truck Crane	160 h.p.			
Link-Belt	15 to 70 ton	130 to 320 h.p.			
Manitowoc	Cranes	320 to 450 h.p.			
Thew	Crawler Crane	160 h.p.			
	Crane, 35 to 75 ton	250 to 262 h.p.			

SHOVELS

American*	¾ to 1¼ yd.	115 to 160 h.p.
Baldwin-Lima	¾ to 4 yd.	115 to 600 h.p.

*Backhoes, clamshells and draglines also available.

...check

EUCLID'S GREATER DIMENSION



SHOVELS continued

MANUFACTURER	CAPACITY OR TYPE	CUMMINS DIESEL	MANUFACTURER	CAPACITY OR TYPE	CUMMINS DIESEL
Bay City	$\frac{3}{4}$ to $1\frac{1}{2}$ yd.	115 to 175 h.p.	Marion	$\frac{3}{4}$ to 4 yd.	100 to 600 h.p.
Bucyrus-Erie	$1\frac{1}{2}$ to 4 yd.	220 to 600 h.p.	Northwest	$1\frac{1}{2}$ yd.	160 h.p.
Dominion	$1\frac{1}{2}$ to $2\frac{1}{2}$ yd.	220 to 300 h.p.	Orton	Crawler & rail shovels	75 to 240 h.p.
Insley	1 to $1\frac{1}{2}$ yd.	130 to 160 h.p.	P & H	$2\frac{1}{2}$ to 4 yd.	290 to 600 h.p.
Koehring	$\frac{3}{4}$ to 3 yd.	160 to 320 h.p.	Thew	$\frac{3}{8}$ to $2\frac{1}{2}$ yd.	70 to 262 h.p.
Link-Belt	1 to 3 yd.	130 to 320 h.p.	Unit	$\frac{3}{4}$ yd.	100 h.p.
Manitowoc	1 to 3 yd.	160 to 320 h.p.	Warner & Swasey, Gradall Div.	Hydraulic Shovels	100 to (2) 130 h.p.

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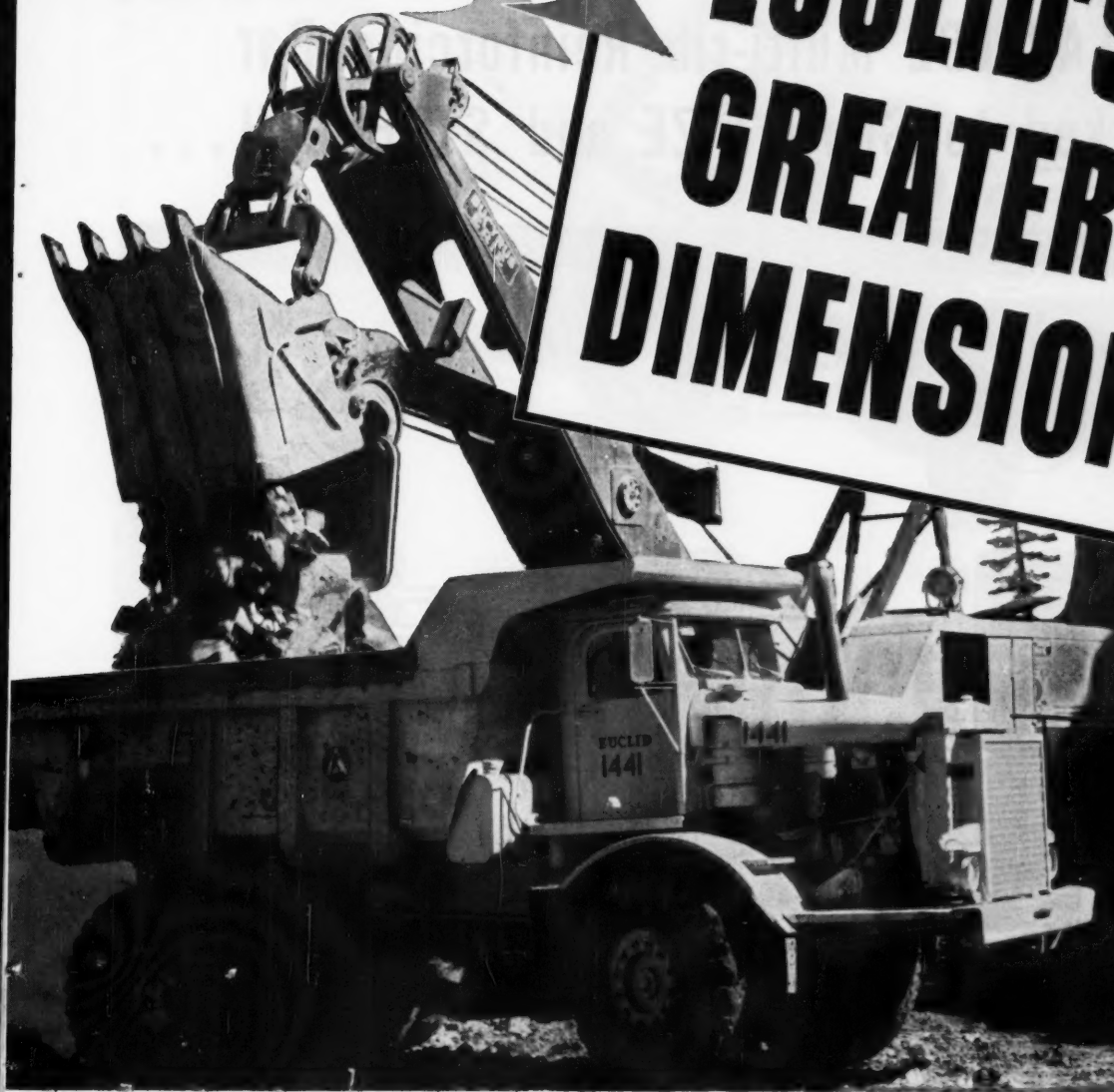


OFF-HIGHWAY HAULAGE UNITS

MANUFACTURER	CAPACITY OR TYPE	CUMMINS DIESEL	MANUFACTURER	CAPACITY OR TYPE	CUMMINS DIESEL
American Coleman	Highway Maintenance Truck	160 h.p.	Cook Bros.	Half-cabs, Mixers and Dumps	175 h.p.
				Bottom Dumps	220 to 335 h.p.
				Rear Dumps	220 h.p.
Autocar	Dump Trucks	220 to 262 h.p.			
	6 x 4 Trucks	175 to 335 h.p.			
	Dump Trucks, 15 to 50 ton	220 to 600 h.p.	Four Wheel Drive	Conventional Trucks, 4 and 6 wheel	175 to 300 h.p.
Brockway	Tandem Trucks	180 to 220 h.p.	General Motors Euclid Div.	Rear Dumps, 15 to 55 ton	175 to 300 h.p.
				Bottom Dumps, 17 to 25 yd.	300 to 335 h.p.
Cline	Trucks	115 to 335 h.p.		Coal Haulers, 25 to 51 ton	220 to 450 h.p.

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EUCLID'S GREATER DIMENSION



OFF-HIGHWAY HAULAGE UNITS continued

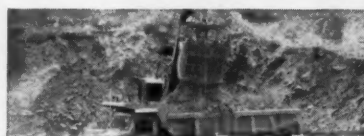
MANUFACTURER	CAPACITY OR TYPE	CUMMINS DIESEL	MANUFACTURER	CAPACITY OR TYPE	CUMMINS DIESEL
Hendrickson	Conventional Truck	450 h.p.	Kenworth	Trucks, 4 and 6 wheel Rear Dumps, 18 to 36 ton Semi and Bottom Dumps, 48 to 70 ton	190 to 335 h.p. 220 to 600 h.p. 335 to 600 h.p.
International (Emeryville)	Trucks	180 to 335 h.p.	Koehring	Dump Truck	220 h.p.
(Fort Wayne)	Trucks	175 to 250 h.p.	LeTourneau- Westinghouse	Haulpak, 20 to 80 ton	320 to 600 h.p.
(Melrose Park)	Payhaulers, 18 to 24 ton	250 to 335 h.p.	Mack	Dump Trucks, 6 wheel Dump Trucks, 15 to 40 ton Tractor, 51 ton Tandem Trucks	220 to 335 h.p. 220 to 450 h.p. 450 h.p. 220 to 320 h.p.
K-W Dart	End Dumps, 10 to 50 ton Shuttle Trucks, 10 to 22 ton Tractor-Trailer Dumps, 48 to 70 ton	160 to 600 h.p. 130 to 290 h.p. 335 to 600 h.p.	Oshkosh	End Dumps, 22 to 28 ton Tractor, 50 ton	300 to 320 h.p. 320 h.p.

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OFF-HIGHWAY HAULAGE UNITS continued

MANUFACTURER	CAPACITY OR TYPE	CUMMINS DIESEL
Pacific	Trucks	190 to 335 h.p.
	Snowplow	250 h.p.
Peterbilt	Dump Trucks	180 to 335 h.p.
Reo	Tandem Trucks	175 h.p.
Sicard	Snow Blowers	130 to 300 h.p.
Walter	Tractor	175 h.p.
	Snow Fighter	190 to 320 h.p.
	Trucks, 28,000 to 66,000 lbs.	175 to 320 h.p.
Ward LaFrance	Truck, 100,000 lbs.	190 h.p.
Warner & Swasey, Duplex Div.	Highway Maintenance	
	Truck	130 to 175 h.p.

HOISTS

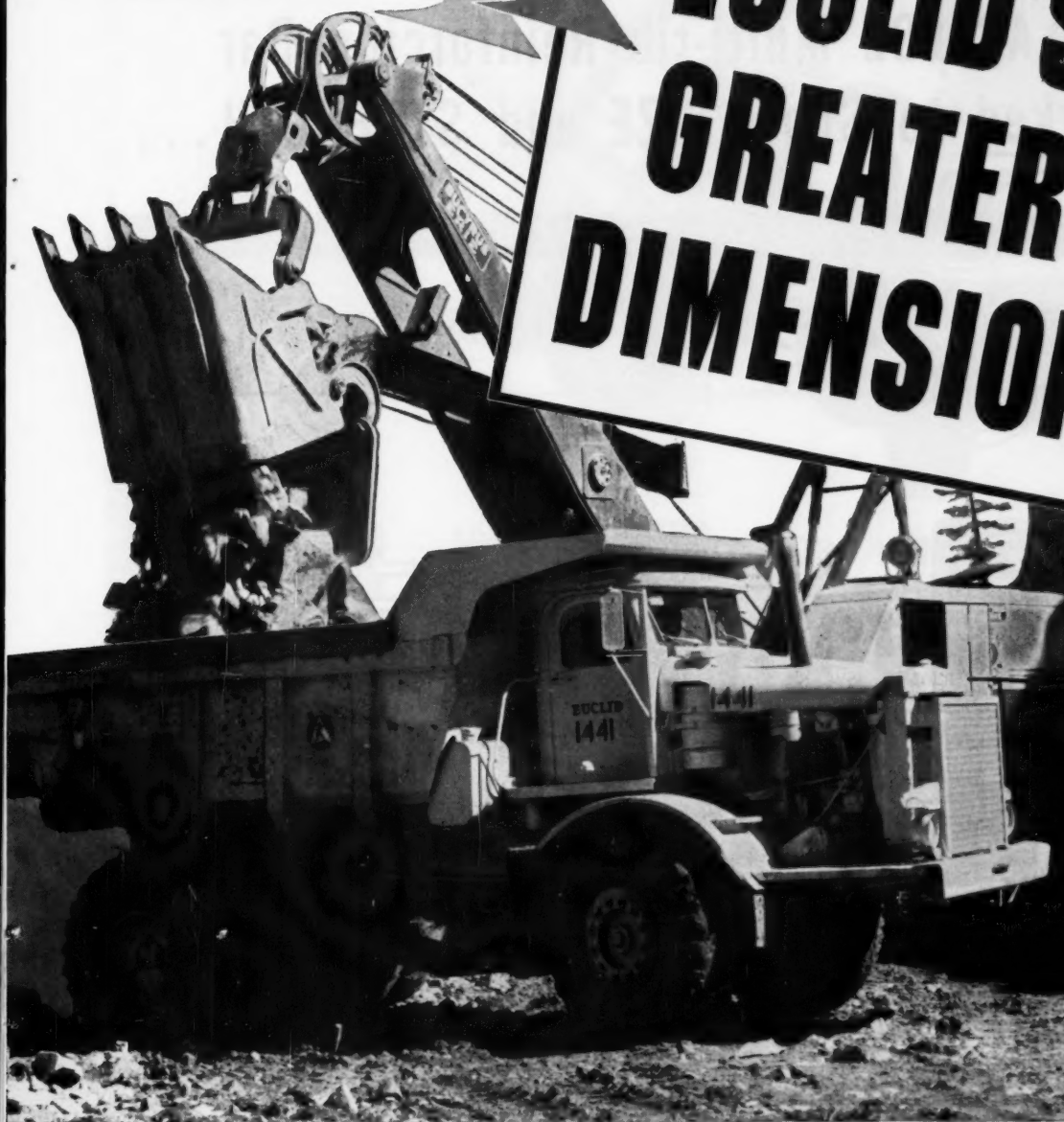
MANUFACTURER	CAPACITY OR TYPE	CUMMINS DIESEL
American Hoist & Derrick	Hoist	160 to 320 h.p.
Clyde	Hoist	115 to 290 h.p.
Industrial Brownhoist	Hoist	160 to 240 h.p.

MIXERS

Barber-Greene	Mixer	100 to 320 h.p.
Bros, Inc.	Roto Mixer	175 h.p.
Pettibone-Wood	Self-propelled Roadmixer Preparer	220 h.p. 220 h.p.

...check

EUCLID'S GREATER DIMENSION



BIG POWER... BIG CAPACITY... BIG PERFORMANCE

Model R-27 has heaped capacity of 26½ yds. ... rated payload is 54,000 lbs. ... available with Cummins 335 h.p. or GM 336 h.p. engine ... 4-speed Torqmatic Drive with converter lock-up and Torqmatic Brake ... dual hydraulic booster steering ... 18.00 x 25 tires on all wheels ... rugged body with twin hoists ... top speed with full payload, 34 mph. ... available in two body types, standard for all-around use and quarry for hauling big rock.

ENGINEERED FOR EASY SERVICING

Like other Euclids, the R-27 is of simple, rugged design for years of dependable performance at minimum maintenance cost. When repair or replacement of major components is necessary, service-minded engineering saves time and money, too. For example, a transmission can be removed and replaced in just one-eighth the time required for the same work on a competitive hauler of the same capacity ... engine replacement takes only one-half as many man-hours.

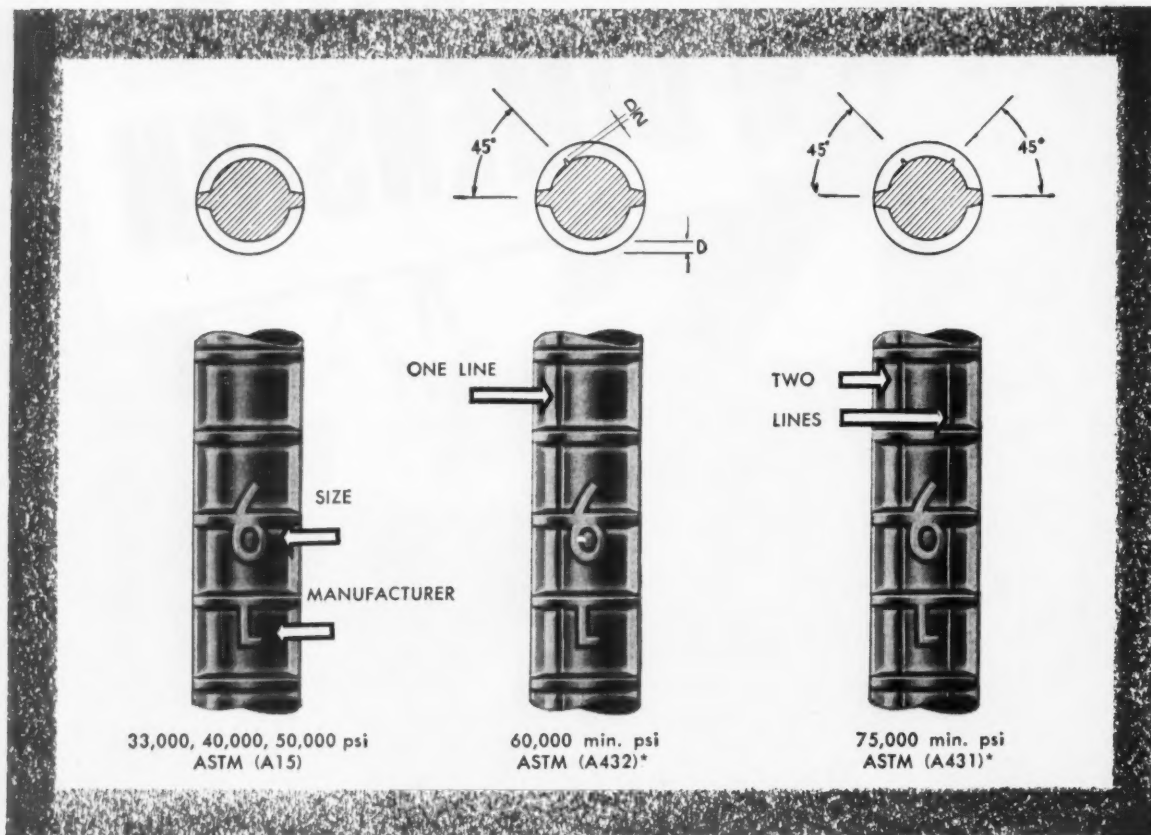


EUCLID EQUIPMENT

FOR MOVING EARTH, ROCK, COAL AND ORE

NOW...

Every LACLEDE Multi-rib Reinforcing Bar is Marked to Show SIZE and STRENGTH...



Standard high strength steels* permitting greater economy and efficiency in reinforced concrete design under the provisions of the new A.C.I. codes must be **identified**. Recognizing this need, each Laclede Multi-rib reinforcing bar can now be completely identified as to size, strength and origin through a new rolled-in marking system. This assures the designer, contractor, and code writer that the proper grade of reinforcement is used on the job.

Demand these new time-saving Laclede bars for your next construction job.



LACLEDE STEEL COMPANY

SAINT LOUIS, MISSOURI

Producers of Steel for Industry and Construction



Here are the reasons why

**GMC TRUCKS
ARE CUTTING
CONTRACTORS' COSTS
ACROSS THE
NATION!**

NEW EXTENDED-LIFE ENGINES

NEW, STRONGER, MORE DURABLE CHASSIS

NEW, WIDE RANGE OF EXTRA-LIFE CABS



CONTRACTORS FAVOR NEW EXTENDED-LIFE V-6 ENGINES!

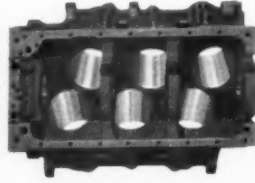
Here's why—these exclusive, rugged engines produce full, usable torque at low, life-saving speeds . . . cut wear and increase fuel economy. Accurately controlled dynamometer and road tests indicate these advanced engines have a life potential of up to 200,000 miles of continuous operation without a major overhaul . . . with the proper maintenance and application.

Completely machined combustion chambers assure equal displacement in each cylinder for smoothest power. There are no destructive "hot spots" due to uneven carbon build-up.

6 bolts around each cylinder (not 4) make a positive head-to-block seal and practically eliminate bore deflection.

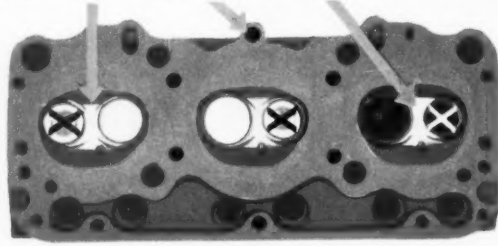
Wide bridge (shown with valves removed); permits better cooling, up to 3 times more water circulation for faster heat transfer and greatly increased valve life.

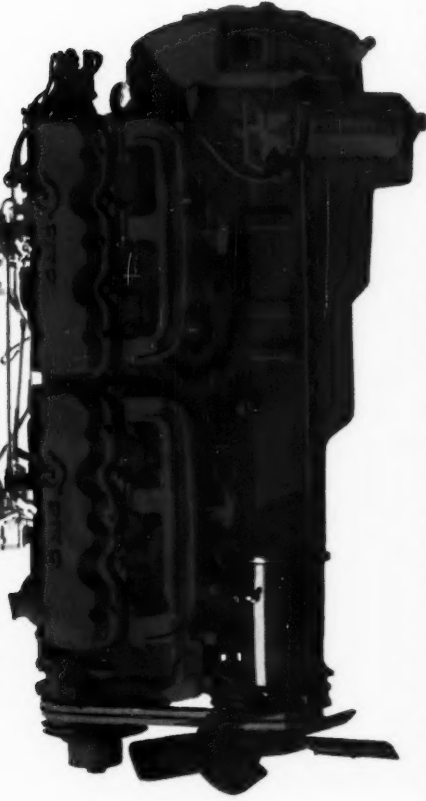
Note: No two exhaust valves (X) are adjacent. This prevents heat concentration and extends valve life.



High-strength, rigid engine block! New short V-6 block, extra strong inner ribbing, staggered cylinders, deep skirt $\frac{3}{4}$ " below crankshaft centerline—all give greater rigidity, add years of life to components.

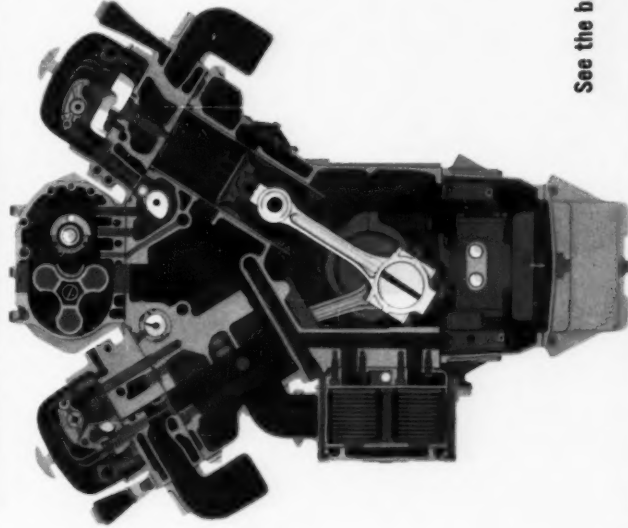
NEW GMC GAS ENGINES PROFIT-PERFORMANCE ON EVERY HAUL			
Model	Gross Torque	Range	Max. Horsepower
305A	258-260 @ 1400-2200		150 @ 3600
305B	264-266 @ 1100-2000		150 @ 3600
305C	268-270 @ 1200-2100		165 @ 3800
351	308-312 @ 1400-2400		180 @ 3400
401	375-377 @ 1200-2000		205 @ 3200
702	625-630 @ 1400-2100		275 @ 2400





NEW TWIN-SIX MOST PULLING POWER OF ANY STANDARD GAS ENGINE! Now contractors are getting 625-630 pounds-feet torque over an extended 700 rpm range! This is all the working power and reserve power needed to get the biggest construction loads moving—and keep them rolling—with least gear shifting.

It has proved to be lasting power, too. Maximum governed engine speed is only 2400 rpm. This low-stress, easy-stroking speed greatly extends engine life, cuts operating costs to the bone.



NEW V-6 DIESELS MORE POWER PER DOLLAR! Proved, efficient 2-cycle design with power on every downstroke gives you more power per dollar, more power per pound, more power per cu. in. displacement! New 6V-71 engines have all the proved performance, economy and durability features of the famous 6-71SE Series, the power plants that have set new time-saving and money-saving records in hundreds of millions of miles of operation.

POWER-MATCH YOUR JOB WITH THESE NEW GMC DIESELS		
Model	Max. Torque	Max. Horsepower
6V-71	577 @ 1200	189 @ 1800 210 @ 2100*

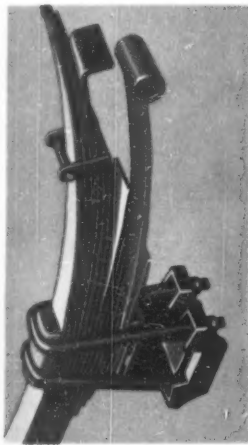
*No extra cost

See the back page for the most advanced trucks in 20 years!

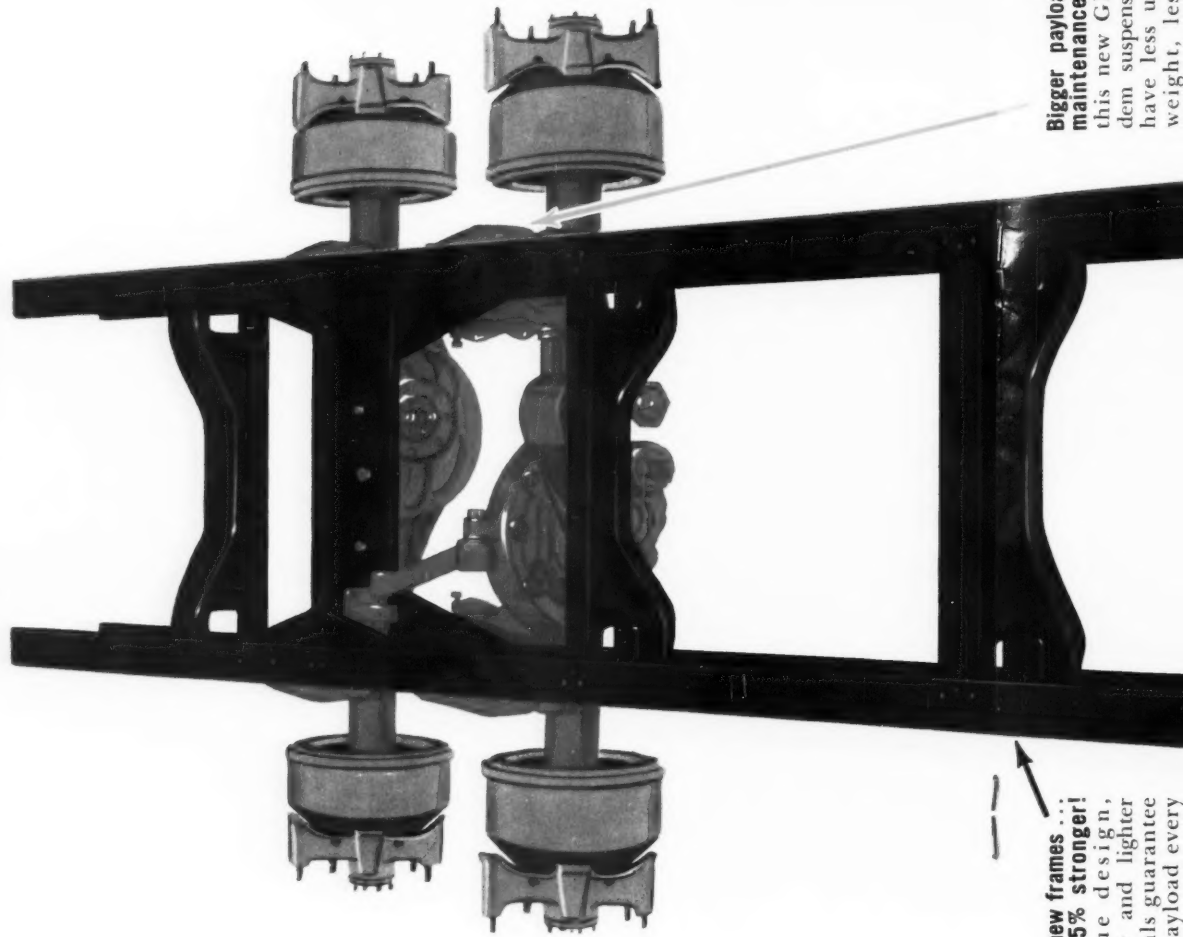
NEW EXTENDED-LIFE ENGINES

NEW, STRONGER, MORE DURABLE CHASSIS

NEW, WIDE RANGE OF EXTRA-LIFE CABS



New vari-rate rear suspension—standard equipment on 4-wheel models! You get longer life with GMC's new 3-inch-wide rear springs because they are under less stress. Braking and torque forces are directed to the frame by radius-rod leaf. New, progressive cam action adjusts to the load for an easier ride.



Totally new frames ... up to 35% stronger! Unique design, stronger and lighter materials guarantee extra payload every

Bigger payloads, less maintenance! With this new GMC tandem suspension, you have less unsprung weight, less truck

maternal guarantee
extra payload every
trip and extra dura-
bility on your hauling
job. 5500 series and
up have new, extra-
strength SAE 950 hi-
tensile steel frame
standard. New L-type
reinforcements are
also stronger.

weight, less truck
weight for bonus pay-
loads. Rubber mounts
and bushings at all
wear points practi-
cally eliminate serv-
ice. True alignment
of axles and equal
load distribution at
all times increase tire
and axle life.

New, stronger, wider track front axles! New high-capacity, longer-life front axles have as much as 12" wider track, wider spring centers for increased stability, shorter turning and improved handling.



Smoother ride, easier handling for 1960! With GMC's new independent front suspension, standard on 4-wheel models through 25,000 GVW, each wheel acts separately to better absorb shocks. You get increased road stability and reduced steering friction. Lighter-duty models have maintenance-free torsion bar springs standard.

See the back page for the most advanced trucks in 20 years!

NEW, STRONGER, MORE DURABLE CHASSIS
NEW, WIDE RANGE OF EXTRA-LIFE CABS

CABS FOR EVERY LOAD, ROAD AND LAW



CONVENTIONAL

Traditional standby for general all-round service. This year, the new GMC 105" BBC cab has wider seats, more head and legroom inside, yet up to 10" lower outside. Bigger windshield gives you more safety vision. New suspended pedals mean easier driving and better cab sealing.

**CONVENTIONAL
NINETY-INCHER**

This is the increasingly popular new 90" BBC conventional-type GMC cab... ideally built to mount big-payload dump bodies, flatbeds and all construction bodies. Greater front axle loading gives better weight distribution for bigger construction hauls.



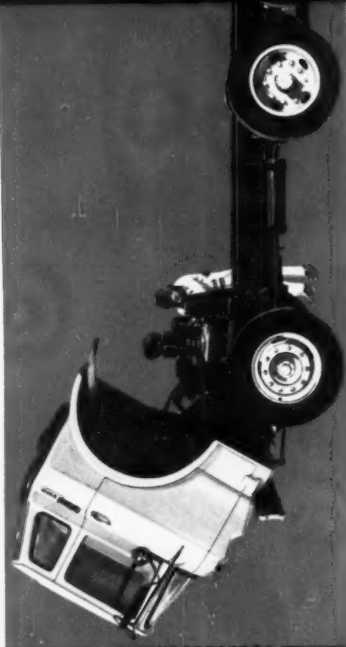
STEEL TILT

With 72" BBC and front axle set-back 52", you have less over-all length and shorter wheelbases to mount longer bodies, haul longer trailers. More weight on the front axle means you can carry bigger payloads. Turning circles are shorter, too. Front vision is the best you can get.

QUICK, EASY SERVICING



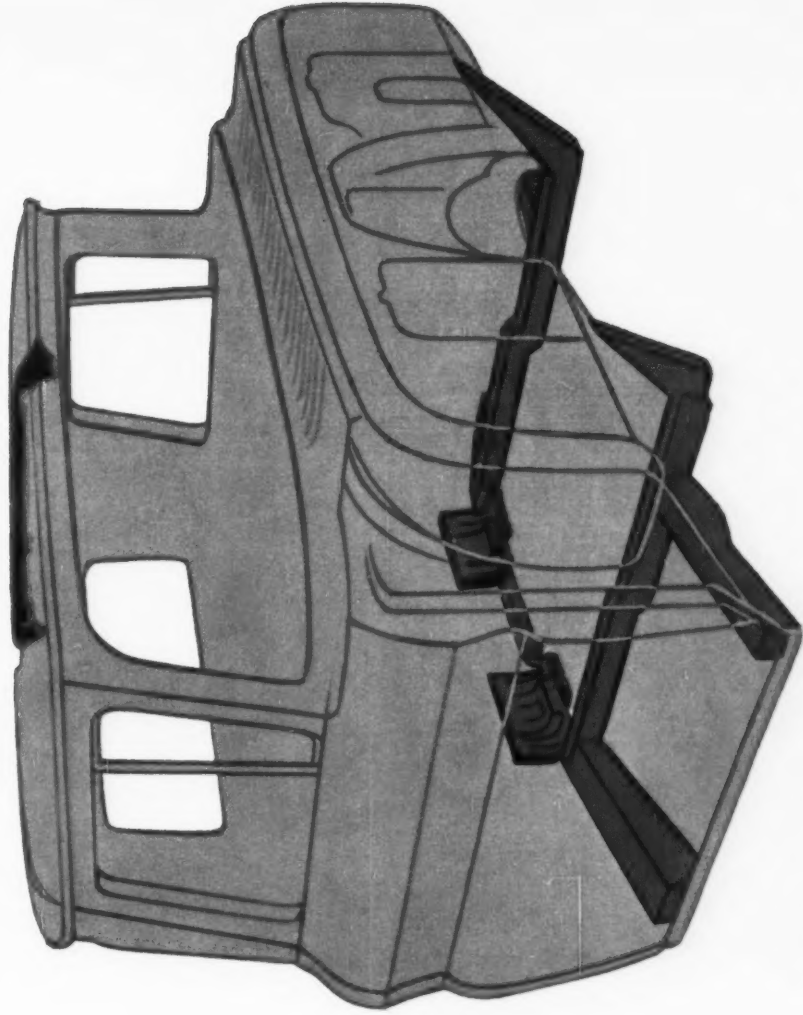
New GMC Conventional Nintey-Inchers speed maintenance and cut costs with the exclusive 3-piece side-opening hood and swing-out grille sections that expose the entire engine compartment.



Manually tilting of GMC's steel tilt-cabs is quick and easy with assist of torsion bar spring. Engine and all accessories are right out in the open for convenient servicing. Stationary island keeps controls in proper alignment and adjustment at all times.

DELUXE QUALITY IS STANDARD

For 1960, GMC is giving contractors all these extra-value features at no extra cost: foam-rubber seats, easily-removed instrument clusters for convenient servicing, steel-framed door windows to prevent chipping, rust inhibitor between door panels, and new 777 Super Enamel that keeps its luster longer, gives greater rust protection than previous finishes.



NEW, EXTRA-LIFE CABS

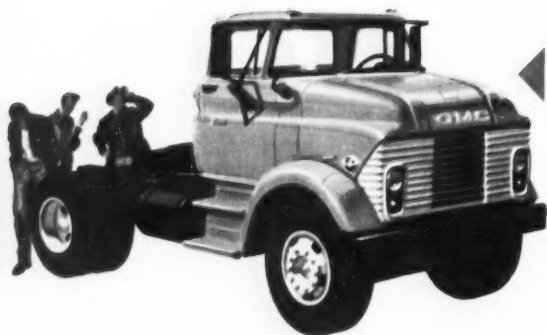
New GMC cabs will stand up for many years even on the most rugged hauls. This greatly extended on-the-job durability is the result of full double-wall construction, extra-heavy reinforcing inside the cab, and special, sturdy understructure—as shown above.

◀ TEAR OUT HERE — See the back page for the most advanced trucks in 20 years!

NEW, WIDE RANGE OF EXTRA-LIFE CABS



Highest performance of any gas-engine tilt-cab! This new GMC LW7000 Series is powered by the exclusive Twin-Six with 625-630 pounds-feet torque at 1400-2100 rpm. Easy-to-service, easy-to-drive steel tilt-cab trucks meet the hauling demands from 19,500 lbs. GVW to 76,000 lbs. GCW.



Increased front axle loading, bigger brakes, frames up to 35% stronger are just a few of the advantages contractors are getting with the industry's first and only full line of 90" BBC trucks. With choice of responsive, extended-life V-6 or Twin-Six gas engines and fuel-saving, high-performance V-6 diesels, you can power-match new Conventional Ninety-Inchers for every construction haul, 19,500 lbs. GVW to 120,000 lbs. GCW.

Contractors' favorite pickups—with good reasons. Only new GMC pickups have more durable cabs; new smoother-riding independent front suspension, exclusive new V-6 power. You can choose from 34 combinations, including rugged 4-wheel drive models.



From ½-ton to 60-ton . . .

General Motors leads the way!

New from the BIG GMC BREAKTHROUGH in truck engineering...a complete new line of "Cost-Busters" that drastically cut your operating costs, increase payloads and last longer on your hauling job. See your GMC Dealer for actual proof. He's listed in the Yellow Pages.

GMC Truck & Coach—a General Motors Division—Pontiac, Michigan

Recent Economic Growth — The Numbers Game

If it truly portrayed recent rates of economic growth in the United States, the report on employment, growth and price levels recently issued by the staff of the Joint (Congressional) Economic Committee would point up scarcely less than a national disaster. Among other things, it would document impressively Premier Khrushchev's crack that "the capitalist steed the United States is riding . . . is worn out."

One of the major findings of the Joint Committee's staff (in the Eckstein Report, named for its staff director Otto Eckstein) is that between 1953 and 1959 the average rate of growth of physical output in the United States was only 2.4 per cent per year. This is scarcely more than half the average annual rate of growth of 4.6 per cent the staff found to have prevailed between 1947 and 1953.

Happily, however, the report does not reflect the basic economic realities. Its finding on relative

rates of economic growth for the two periods is a statistical *tour de force* which, by the selection of certain figures and certain dates, distorts the record of America's long-term economic growth.

Playing The Numbers Game

By the selection of appropriate starting and terminal periods it is possible to document almost any rate of economic growth that is desired. The table at the bottom of this page shows you how this can be done. It will also show you how the Eckstein staff worked out its shocking contrast in growth rates. The table is built like a schedule of airplane fares between different cities. The postwar years 1946 through 1959 are put down on two axes. One runs down the left hand column, the other runs across the top of the table. Put your finger on the point where the two axes intersect and you have the average rate of growth for the period covered.

ANNUAL AVERAGE GROWTH RATES OF THE U.S. ECONOMY, 1946-1959*

(Percent increases, starting year to terminal year, of GNP in 1954 dollars).

Starting Year	Terminal Year													
	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
1946	X	-0.1	-1.9	-1.2	3.0	3.9	3.8	3.9	3.2	3.7	3.6	3.4	2.9	3.2
1947	X	X	3.8	1.8	4.1	4.9	4.6	4.6	3.7	4.2	4.0	3.8	3.2	3.5
1948	X	X	X	-0.1	4.2	5.3	4.8	4.7	3.6	4.3	4.0	3.8	3.1	3.4
1949	X	X	X	X	8.7	8.1	6.5	6.0	4.4	5.0	4.6	4.2	3.5	3.8
1950	X	X	X	X	X	7.4	5.4	5.1	3.4	4.3	3.9	3.6	2.9	3.3
1951	X	X	X	X	X	X	3.4	3.9	2.0	3.5	3.2	3.0	2.2	2.8
1952	X	X	X	X	X	X	X	4.4	1.3	3.6	3.2	2.9	2.0	2.6
1953	X	X	X	X	X	X	X	X	-1.6	3.2	2.8	2.6	1.6	2.4
1954	X	X	X	X	X	X	X	X	X	8.1	5.1	4.0	2.4	3.2
1955	X	X	X	X	X	X	X	X	X	X	2.1	2.0	0.5	2.0
1956	X	X	X	X	X	X	X	X	X	X	X	1.8	-0.2	2.0
1957	X	X	X	X	X	X	X	X	X	X	X	X	-2.3	2.0
1958	X	X	X	X	X	X	X	X	X	X	X	X	X	7.0
1959														

*Compound rates of growth

RECENT ECONOMIC GROWTH... continued

Following this procedure, you can find growth rates ranging all the way from -2.3 per cent, between 1957 and 1958, to +8.7 per cent, between 1949 and 1950, along with almost any other rate you would choose for various years and sequences of several years over the postwar period.

For example, if you want to demonstrate that the postwar growth rate through 1953 was less than 4% per year, you take off from 1946, include a drop of 0.1 per cent between 1946 and 1947, and come up with a growth rate for the 1946-1953 period of 3.9 per cent. But if you want to show it was quite high, you take off a year later, from 1947 (which drops out that dismal -0.1 per cent for 1947) and come up with a fine growth rate of 4.6 per cent for the 1947-1953 years.

Statistical Hocus-Pocus

That's what the Eckstein staff did. It took off at one end from a year when there was just about no growth, went to the Korean War boom year of 1953 at the other end, and got that average growth rate of 4.6 per cent. Then it took off from the Korean War boom year of 1953 and ran to the year 1959, when business was recovering from a recession and suffered through a steel strike of 116 days, to come up with its 2.4 per cent growth rate for the second postwar period. As the table indicates, by taking off a year later (1954) the average growth rate would have become 3.2 per cent, and if the take off had been 1949 it would have been 3.8 per cent.

There are those who, in nontechnical terms, would characterize this as statistical hocus-pocus. There are also those who would see in it an element of political hocus-pocus, too. This is because the years 1947-53, when the Eckstein staff found there had been the healthy 4.6 per cent growth rate, were roughly years when we had a Democratic president, while the anemic growth rate of 2.4 per cent it calculated for the subsequent years was for years of a Republican presidency.

Actually it can be shown that the civilian part of our economy has had more rapid growth during the Republican administration than it had during the Democratic years. If military expenditures are subtracted from the national output, the resulting growth rate for 1953 to 1959 is slightly higher than for 1947 to 1953.

However, we do not question the *bona fides* of the Eckstein staff. **But we do assert that it has produced a statistical picture of the postwar growth of the American economy which is dangerously misleading both at home and abroad.**

Abroad, the report appears to give official documentation to the propaganda line that the Soviet economy is running rings around the U.S. economy in growth, and that it is Communism a country should choose if it really wants to develop rapidly. Building on a much smaller economic base than the U.S.A., the Soviet Union — as well as almost every less advanced nation

in the world — is bound to show a larger percentage increase in output than the U.S.A. But the Eckstein staff calculation gives the Communists ammunition they don't deserve.

Are We Facing A Crisis?

The contrast drawn by the Joint Committee staff in postwar U.S. growth rates suggests that we are facing scarcely less than a crisis through paralysis of our economic growth which calls for drastic remedies. But this, as the full 1947 to 1959 growth record set forth in the table makes clear, is very definitely not the case. Our over-all postwar rate of growth, as measured by the gross national product in physical terms, has been 3.5 per cent per year, a rate nearly double the long-term growth rate of 2 per cent per year between 1909 and 1939. In the continuing fluctuations in the rate of growth which more or less inevitably characterize a relatively free economy, we have had some downs in recent years. **But our economy is now on the upbeat again. And at the end of this year, the U.S. economic growth rate for the postwar period can be expected to be 3.7 per cent per year.**

It is extremely important for the United States to continue to maintain this rate of economic growth or even to surpass it. Upon this effort depends our capacity to meet our defense requirements without dangerous strain, to provide an adequate margin for foreign aid, to improve our own productive facilities, and to continue to raise our own standard of living.

How not only to maintain but possibly improve upon our postwar pace of economic growth will be the subject of strenuous debate in the months ahead. However, the debate will have a much better chance of being constructive if the postwar growth record is seen in proper perspective. To this end one of the first things to do is to junk panic rousing statistical portrayals such as that in the Eckstein report.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nation-wide developments. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or parts of the text.

Donald C. McGraw

PRESIDENT

McGRAW-HILL PUBLISHING COMPANY, INC.

Heller Cuts the Financial Red Tape that costs you time and money

Nobody understands a contractor's needs like another construction man, and that's the kind of Heller man you and your distributor deal with when you want equipment financing. Heller men are not hampered by elaborate rules and red tape, and they know the

value of time. They quickly set up a plan you can handle, with room for profit for you. Know how Heller's ready cash and practical point of view may help you grow. Ask your distributor; or write us. Dept. CM&E-5

*Over one billion dollars
annually for industry*

Walter E. Heller & Company

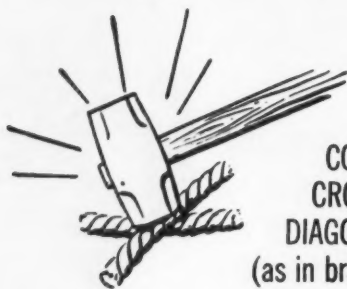
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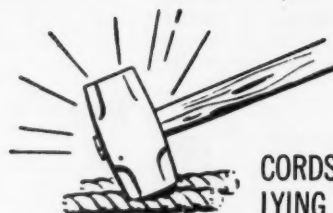


ROYAL CORD AIR HOSE

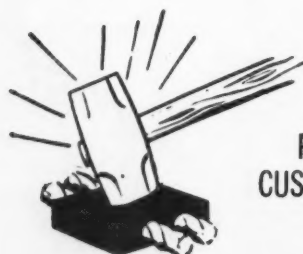
WHICH HOSE CONSTRUCTION CAN TAKE THE BEATING?



CORDS
CROSSED
DIAGONALLY?
(as in braided hose)



CORDS
LYING PARALLEL?



OR

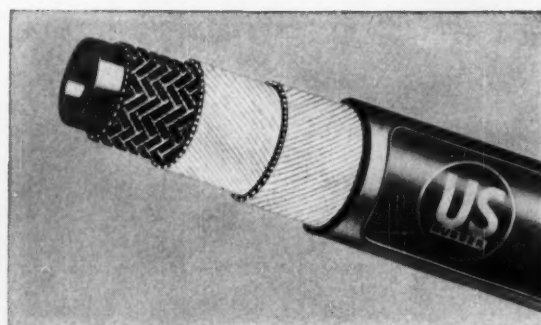
PARALLEL CORDS
CUSHIONED IN RUBBER

as in U. S. Royal Cord Air Hose?

Yes, the exclusive "U. S." development—parallel cords cushioned in rubber can take and *do* take the *most* pounding. Observe how the cords run parallel in each of the two pressure-resisting plies; there is no crossing as in conventional braided hose. Each ply is separated by a layer of rubber—each cord is cushioned in rubber. This means there can be no friction created between cords, and therefore no chance of any shearing within the carcass.*

A hose with spiral plies is *always* stronger, because more strands can be used throughout the entire hose length than can be used in other constructions. *U. S. Royal Cord Air Hose has the same construction as that of a tire.* This is the exclusive quality you find under its cover.

The exclusive and outstanding features you get in U. S. Royal Cord Air Hose constitute one of the main reasons why



U. S. Rubber is the largest manufacturer of the widest range of industrial rubber products serving industry.

When you think of rubber, think of your "U. S." Distributor. He's your best on-the-spot source of technical aid, quick delivery and quality industrial rubber products.

*This same exclusive cord construction is also built into "U. S." water, steam, dock and fire hose.



Mechanical Goods Division

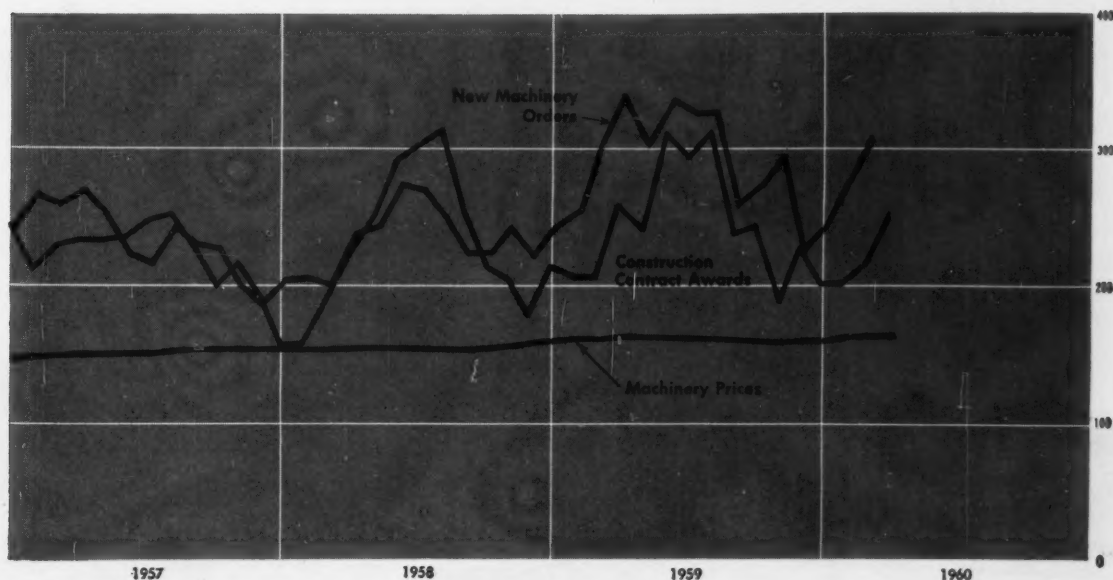
United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N. Y.

In Canada: Dominion Rubber Company, Ltd.

Trends in the Machinery Market...



Price Index

	MARCH 1960	MONTH AGO	YEAR AGO	% CHANGE 1959-1960
All Types of Equipment	174.2	173.9	171.4	+ 1.6
Cranes; Draglines, Shovels	172.1	171.9	168.7	+ 2.0
Shovel, ½ cu yd	167.7	166.2	156.2	+ 7.3
Shovel, ¾ cu yd	174.7	174.7	173.3	+ 0.8
Shovel, 1-1½ cu yd	187.0	187.0	184.6	+ 1.3
Shovel, 2-2½ cu yd	166.4	166.4	159.5	+ 4.7
Shovel, 3-3½ cu yd	167.8	167.8	167.8	0
Shovel, 6 cu yd	195.0	195.0	188.2	+ 3.6
Crane, truck mounted	168.2	168.2	169.4	- 0.8
Crane, tractor mounted	135.1	135.1	135.1	0
Bucket, clam shell	157.5	157.5	157.5	0
Bucket, dragline	169.3	169.3	169.3	0
Scrapers and Graders	165.8	165.8	163.8	+ 1.2
Scraper, 4 Wheel, 8-10.5 cu yd	155.0	155.0	155.0	0
Scraper, 4 Wheel, 12-15 cu yd	156.8	156.8	156.8	0
Scraper, 2 Wheel, 15-19.5 cu yd (a)	124.9	124.9	123.7	+ 0.9
Grader, heavy duty	172.6	172.6	171.1	+ 0.8
Grader, light & medium	171.1	171.1	166.1	+ 3.0
Tractors (non-farm, incl industrial)	190.7	189.9	187.8	+ 1.5
Wheel type, off-highway (a)	129.0	129.0	128.2	+ 0.6
Crawler type, 50-74 dhp	197.2	195.2	191.9*	+ 2.7
75-99 dhp	201.2	200.2	196.4	+ 2.4
100-154 dhp	192.4	192.4	191.3	+ 0.5
155-200 dhp	203.3	203.3	201.4	+ 0.9
Machinery, Tractor Mounted	169.0	169.0	168.6	+ 0.2
Dozer, cable controlled	154.4	154.4	154.4	0
Dozer, hydraulic controlled	186.6	186.6	186.6	0
Cable power control unit	151.4	151.4	151.4	0
Loader, tractor shovel	162.5	162.5	161.5	+ 0.6
Specialized Machinery	157.7	157.7*	153.3	+ 2.8
Ditcher	150.2	150.2*	156.6	- 4.1
Roller, tandem	226.4	226.4*	198.6	+13.9
Roller, 3 wheel	178.7	178.7	170.2	+ 4.9
Ripper and rooper	150.5	150.5	150.5	0
Dewatering pump, 10 M gph	111.5	111.5*	110.6	- 0.8
Dewatering pump, 90 M gph	151.5	151.5	148.3	+ 2.1
Portable Air Compressors	167.5	167.5	159.5	+ 5.0
Contractor's Air Tools	181.6	181.6	181.6	0
Mixers, Pavers, Spreaders	158.6	158.6	155.8	+ 1.7
Mixer, portable, 11 cu ft	166.8	166.8	164.1	+ 1.6
Mixer, portable, 16 cu ft	172.7	172.7	168.6	+ 2.4
Mixer, truck, 6 cu yd	132.7	132.7	131.1	+ 1.2
Mixer, paving, 34 cu ft	193.5	193.5	191.6	+ 1.0
Concrete finisher & spreader	199.7	199.7	191.5	+ 4.2
Bituminous distributor	126.2	126.2	122.3	+ 3.1
Bituminous spreader	170.2	170.2	170.2	0
Bituminous paver	163.2	163.2	162.6	+ 0.3
Off-Highway Trucks, Wagons (b)	101.1	101.1	100.6	0
Contractors off-highway truck (b)	101.1	101.1	100.6	0
Trailer dump wagon (b)	101.4	101.4	101.4	0

* (a) January 1955=100 • (b) January, 1958=100 *Revised
BLS Primary Market Price Indexes, U. S. Department of Labor, 1947-49=100

Contractors Step Up Equipment Buying

Construction equipment orders are living up to manufacturers' high expectations. February orders for construction and mining equipment jumped 12% above January. And for the second consecutive month, dollar value of new equipment orders set a new high for the respective month.

The February New Orders Index rises to 309, based on average monthly dollar volume in 1949 as 100. This is about 4% more than the previous February highs set in 1949 and 1951, according to the McGraw-Hill Economics Department.

While these burgeoning orders for new construction machinery reflect a rise in contractors' new business last month, it is significant that equipment orders are rising faster than construction contracts. This is probably because contractors see increasing evidence of a strong upsurge in contracts. They are preparing for record business this spring.

Selective price increases on crawler shovels and tractors nudged average list prices up to a record on March 15. The Bureau of Labor Statistics index of manufacturers' list prices moved up to 174.2. This BLS index based on average construction equipment prices in 1947-49 as 100, is 0.2% above the previous record peak set last month. And it tops March 1959 by 1.6%.

We misled you in April's report that Bucyrus-Erie "slashed prices" on certain crawler shovels. Prices were not changed, but bucket capacities on the new improved "Series Two" models were increased so contractors now pay about 14% to 20% less per yard of capacity, f.o.b. plant, for the 54-B, 71-B, and 88-B machines. The 54-B is now a 3-yd shovel; 71-B now 3½-yd; and 88-B now 5-yd.

NEW

MANITOWOC 4500 VICON



A MAJOR ENGINEERING BREAK-THROUGH IN EXCAVATOR DESIGN

You get up to 25% more output with "integrated" controls, the "VICON" system of power application and control, and the new "interlock" drum arrangement

The Manitowoc 4500 Vicon is a 6 yard shovel or 7 yard dragline, incorporating an entirely new concept of excavator design and performance. Over 3 years of on-the-job-experience has proved its soundness of design, greater ease of operation; much faster operating cycles; greatly reduced maintenance costs; and far greater output from both shovels and draglines.

"Integrated" Controls Simplify Operation, Clutch Slippage Eliminated

Operating the Vicon is like flying . . . Cycle phases are that smooth, that "integrated"! Even green hands get results because it takes 50% less operator movement to run the machine.

Conventional engine throttles have been eliminated. Each clutch control lever in the high visibility Vicon pilot house is *also* a throttle! Engaging a swing or drum clutch, for instance, involves simply pushing (or pulling) the clutch control lever from dead center

(stop) position. The further the lever is moved in the natural direction of the machine's movement the faster and harder it works in that direction.

There is no slippage when clutches are engaged because the first 10° of control lever movement does not activate the throttle—therefore, clutch engagement is effected at low engine R.P.M. and almost zero clutch and drum R.P.M. By *continuing* to move the clutch control lever, which is also the throttle, the machinery is accelerated via fast, smooth, three stage torque converter against the load . . . without *any* clutch slippage.

No Brakes Needed To Stop The Swinging Action

In conventional excavators it is normal to apply considerable "braking" effort to halt the "swing" of the machine so that it can be started in the opposite direction. *Before* "Vicon" it was necessary for the opposite clutch or swing brake to take this thrust (the disadvantages of excessive friction heat and wear are obvious). With Vicon the machine stops swinging one way and very smoothly accelerates in the opposite direction because the torque converter acts like a brake, absorbs directional thrust, eliminates shock and slip on the swing frictions and then provides instant acceleration for the return swing.

Engine Application Has Great Versatility

"Vicon" is two engine power applied in a way never before used for power shovels and draglines . . . and with boundless advantages in performance, maintenance characteristics, and production! One engine provides the power for swing and travel while the other powers the drums . . . allowing you to perform several functions simultaneously, in a smooth blending of cycle phases that provide operating speeds beyond the capabilities of conventional excavators.

Vicon design gives you faster, smoother clutch engagement with drastic improvements on the conventional problem of wear, heat and fade . . . yet you maintain top working speeds.

With the Vicon power application, certain operating advantages are immediately obvious . . . For instance, one engine may be slowed down to accommodate an extremely tough phase of the cycle without jeopardizing the ability of the other engine to immediately take over the following phase of the working cycle. Or, one engine may complete its assignment at a relatively high speed while the power of the other is introduced at idling R.P.M. to take over the next phase of the work. Valuable production time is not lost because of engine "lug down". On the other hand, clutches are not jammed into engagement at high and harmful engine speeds . . . The result, a smoother, faster, more economical operation with greater output, longer machine life, better all-around performance.

"Interlock" Reduces Brake Use By 50%

Vicon operation is so smooth that the machine seems to loaf on the job. Yardage totals, however, tell the true story. For instance, on the Vicon dragline you get the new "interlock" drum arrangement which suspends the dragline bucket in the middle of an endless line . . . cuts brake use up to 50% and you take advantage of full horsepower on the hoist (instead of burning it up on the brakes).

Vicon Has Doubled Drum Brake Capacity

You get higher speed dragline cycles than were ever before possible—and designed into this new Vicon component is another innovation included specifically to give pin-point control and increase production.

Both outside flanges of both the front and rear drums of the Vicon serve as big, fast acting efficient braking surfaces. The advantages are readily apparent on various stripping locations where the operators take pride in maintaining such pin-point casting control that they actually trim and maintain vertical side walls. It is common, for instance, to see a Vicon operator taking advantage of Vicon "Interlock" making high



speed casts with the bucket held in a vertical position (teeth down). The bucket rushes out at full speed, is stopped smoothly over the top of the cut and then allowed to drop vertically to trim the wall. Vicon dragline drum "interlock" and drum brakes are in a class by themselves. Production gains are assured!

Other Innovations Are Yours With Vicon

For instance, a big universal radiator system gives you double the cooling capacity. Advantages of the Vicon cooling system are never more obvious than in prolonged travel with the Vicon maneuvering easily from one job location to the other. Travel, a situation embodying the most serious over-heating possibilities for the conventional machine, is no problem for the Vicon . . . which simply utilizes two engine cooling capacity for the operation of a single power system.

Shovel Has Less Weight—More Power On "Business End"

The Vicon shovel has all the advantages of the big, tough Model 4500 tubular style dipper stick and having separate hoist lines rigged from either side of the shovel bail to the other end of a reduction drive mounted on the base of the shovel boom—eliminating the weight and instability of a bail sheave at the bucket, plus bad fleet angles on the hoist cables.

There are many, many more design and operating features adding up to more output—reduced maintenance costs and lower cost yardage. Before you buy any machine in this class, it will pay you to get the complete story on the sensational 4500 Vicon.

MANITOWOC ENGINEERING CORP.

(A Subsidiary of The Manitowoc Company, Inc.)

Manitowoc, Wisconsin

SHOVELS

1¼ — 6 YDS.

CRANES

25 — 125 TONS

DRAGLINES

1¼ — 7 YDS.

TRENCH HOES

1¼ — 3 YDS.



Model 774 shown with standard 5'6" depth, 30" width wheel. Optional model digs to 7' depth.

BARBER-GREENES YOU A 25-100%

The big difference: Hydra-Crowd transmission that lets you instantly dial maximum crowding speed for any ground condition

Barber-Greene wheel ditchers obsolete all others digging to 5'6" and 7' depths by out-producing them from 25 to 100% every day. And your Barber-Greene delivers a peak production pay-off in: 1) variable ground conditions; 2) frost, caliche, and hard pan-type; and 3) sticky gumbo-type digging.

Exclusive dual-range Hydra-Crowd transmission makes the big difference, enabling your operator to dial *instantly* the maximum crowding speed for any ground condition, or reverse *instantly*, too. He selects from *infinitely variable* crowding speeds independent of wheel and conveyor drive. No four-operation gear shifting. No guessing about gear ranges. No stopping to change speeds.

More Barber-Greene exclusives that contribute to precision performance with lowest cost of operation include:

- Flexible drawbar between chassis and boom con-

tinually absorbs digging shocks, reduces transfer of twist and tilt from wheel to chassis when digging curves or over uneven ground.

- All-hydraulic spoil conveyor independent of wheel speeds for instant selection of infinitely variable speeds—instant reverse.
- Hydraulic controls give greatest accuracy in digging to line and grade.
- Crawlers are easily adjusted in one-tenth the time of ordinary crawlers.
- Automatic overload guard, hydraulic brakes and hydraulic wheel hoist protect both man and machine.

Call your Barber-Greene distributor for your on-job demonstration. You'll get proof why you can't afford to dig ditch with any other machine.

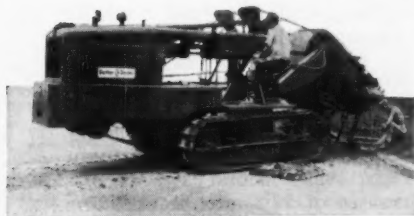


Model 772 digs to 5'6" depth in cutting widths from 10-24". Model 773 is identical except for wider track gauge pad widths.

WHEEL AND DEAL DITCHING BONUS

MODEL 774—INDUSTRY'S BIGGEST BUY FOR DIGGING 7-FT. DITCH

The new Barber-Greene Model 774 Wheel Ditcher can be equipped with a 7-ft. wheel with complete options and accessories for 50% less than you pay for any other wheel ditcher that can dig this depth. Call for prices and be convinced.



Crawler, rubber-tired Barber-Greene Vertical Boom Ditchers cut low costs trench from 5½ to 24-in. wide and to 7 ft. deep. Model 784 is shown.

Manufacturer of the only modern ditcher line

Representatives in Principal Cities of the World

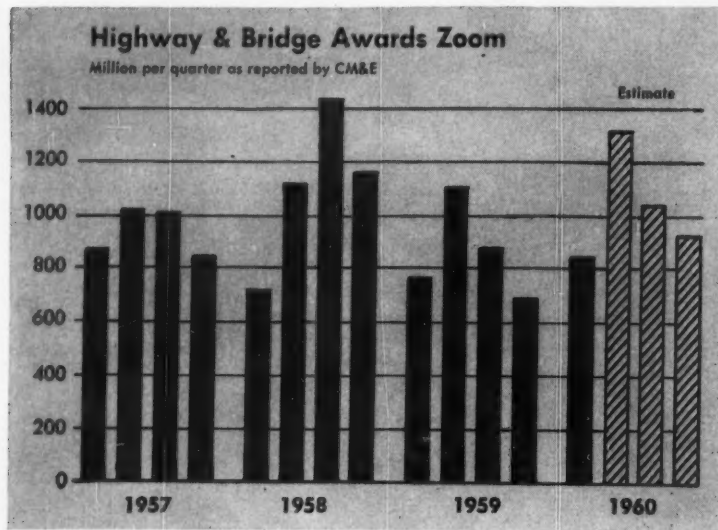
Barber-Greene

Main Office and Plant: AURORA, ILLINOIS, U. S. A.
Plants in DeKalb, Illinois..Detroit..Canada..England..Brazil..Australia



CONVEYORS • LOADERS • DITCHERS • ASPHALT PAVING EQUIPMENT

Construction Business...



Highways and Bridges Boom Again

CONTRACTORS on highway and bridge construction are busier now than in any other spring in history. New business is booming. From a very soggy, slow January-March quarter of new business, the industry has swung quickly into high gear to take on the huge volume of contracts advertised by state highway departments.

New contracts for highways and bridges should average \$100 million per week during the April-June quarter, including state, county, municipal and toll projects. *Construction Methods* forecasts that contracts for this quarter will total \$1,325 million, a 55% jump above the first quarter's volume.

Moreover, this should be the second biggest quarter for contractors' new highway and bridge business, topped only by July-September '58, when Congress anted up extra federal aid to spur highway construction as a sure-fire way of helping to pull the nation's economy out of a recession. But the current quarter probably will come within 7% of matching the record, according to *Construction Methods'* forecast.

By the June 30 half-way mark,

1960 contracts should total about \$2.2 billion, up 16% over last year, and a record first half. Though the pace will slacken this summer, in keeping with seasonal contracting patterns and the Bureau of Public Roads contract control system, awards will probably average \$80 million a week in the July-September quarter. This would be 18% above the low pace in the same period of 1959, when states started to cut back federal-aid highway and bridge contracting in response to BPR's warning that they might not be reimbursed for highway expenditures because the Highway Trust Fund was near exhaustion.

Contracting will probably taper off a little bit more in the fourth quarter to a weekly average of a little over \$70 million. This would be 32% more than during the October-December bottom of the 1959 slump.

The final result: 1960 will be the second biggest highway and bridge contract year on record. CM&E forecasts the total at \$4,145 million, up 20% over last year and only 6% under 1958's all-time high. (This forecast only includes projects costing \$88,000 or more, as reported by CM&E.)

These bright prospects, bolstering an earlier CM&E forecast (Jan. p. 117) have the solid backing of state highway departments' plans. Fifty states report that they hope to let a combined total of \$4.3 billion in 1960 contracts (see p. 55). This is 27% more than they awarded last year.

Thirty-eight states plan to increase contract volume this year, while only 11 will cut back.

Actually, state highway departments as a whole are more optimistic than CM&E's forecast—the states plan total \$4.3 billion as against CM&E's forecast of slightly less than that for all state and other highway and bridge contracting agencies; states plan a 27% increase compared with CM&E's forecast of a 20% rise in over-all volume.

These differences in volume and percentage increase are to be expected. In previous annual surveys of state highway contracting plans, the departments have been over-optimistic.

Interstate projects account for over \$1.9 billion, or 46% of total contracting plans for 1960. Thirty-four states plan to increase interstate awards, with ten planning to more than double their 1959 volume: Massachusetts 128% up; Rhode Island +646%; Pennsylvania +376%; Tennessee +105%; Michigan +134%; Missouri +134%; Nebraska +144%; Montana +167%; Wyoming +134%; and Nevada +590%.

Biggest plans for interstate projects are Ohio's \$140 million, followed by Michigan's \$134 million, California's \$130 million, Illinois' \$111 million, Massachusetts' \$110 million, and New York's \$102 million, New Jersey's \$101 million.

Interstate contracting plans are larger and call for a bigger increase in 1960 than other state highway systems. Plans for ABC federal-aid highway awards total \$1.8 billion or 42% of the grand total, and 100% state-financed projects account for 13% with \$547 million. While interstate plans call for a 34% jump over 1959's actual awards, increases of 28% are planned for ABC projects. A 5% increase is planned for work financed solely by state funds.

continued on page 55

NEW CAT DW20-482 TEAM

HAULS BIG LOADS FAST, INCREASES PRODUCTION



Six-minute cycles on nearly a two-mile round trip hauling 24 bank cu. yd. of slow-loading sand! This is the production from two big Cat DW20G Tractors with new 482 Scrapers speeding road construction on State Highway No. 99 in Marshall County, Oklahoma. The big rigs are owned by the W. D. Jeffrey Construction Company of Fort Smith, Arkansas, contractors on this job.

"The new DW20 and 482 Scraper have a faster cycle and loading time which means higher production," comments Superintendent "Smoky" Branson. He adds, "Down time on equipment is minimum."

The DW20's 345 HP results in 12% increase in rimpull over the former model. This provides up to 20% faster travel speeds under similar haul road conditions. The 482 Scraper is teamed with the

DW20 for high production with its 24 cu. yd. struck load capacity (34 cu. yd. heaped). On this job the DW20-482 combination loaded in .93 minute.

Field reports from contractors all over the country confirm the productive efficiency of the big DW20-482 combination. Get the facts from your Caterpillar Dealer. He can prove—right on your job—that economical, high production is built into the new DW20 and 482.

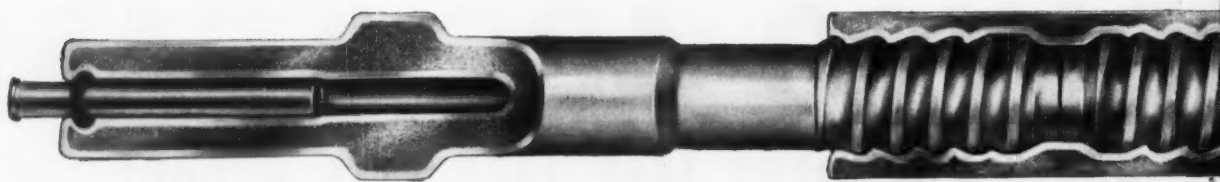
Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

**PICK THE
DW20-482 TO BREAK
PRODUCTION RECORDS**

You'll scrap all your old ideas about drill steel when



ONLY GARDNER-DENVER

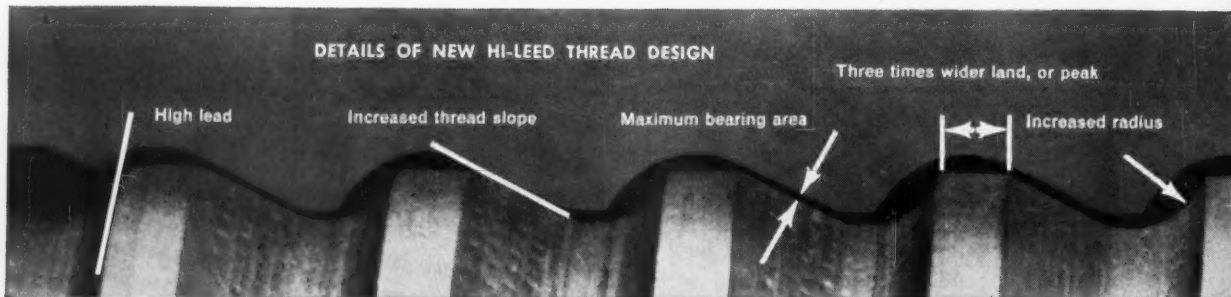
gives you all these field-

**ALWAYS UNCOUPLES
BY HAND**

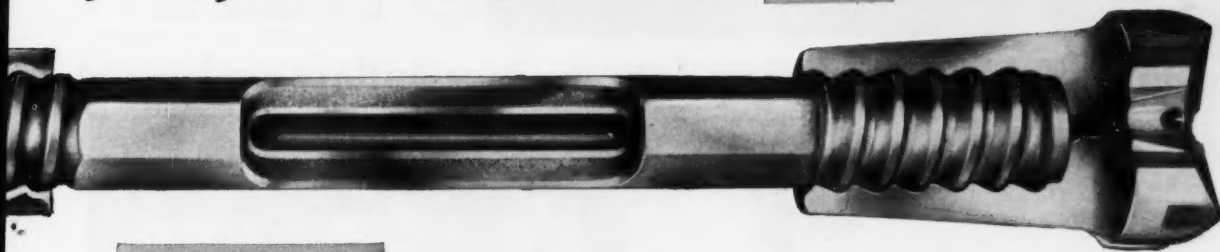
New HI-LEED thread design makes wrenching unnecessary. Gardner-Denver engineers have incorporated field-proved reverse buttress design into an entirely new thread form that always uncouples by hand.



DETAILS OF NEW HI-LEED THREAD DESIGN



you try NEW GARDNER-DENVER **HI-LEED** STEEL



HI-LEED DRILL STEEL

proved advantages

**CUTS DRILLING TIME
ON EVERY HOLE**

HI-LEED steel saves time in adding rod . . . and ease of uncoupling, without use of wrenches, helps drill hole faster.

**SENDS MORE IMPACT
TO THE BIT**

HI-LEED sectional steel transmits drill impact almost as well as a solid rod. That's because precision-milled threads on rod and coupling are in close contact over a large total area, thus holding rod ends firmly together.

**DRILLS MORE FOOTAGE
PER ROD**

HI-LEED rods are designed to last longer than any other sectional steel, and the wide thread peak assures maximum wear.

Design details are carefully engineered to eliminate much of the usual friction and stress concentrations. Carburizing and shot-peening give the steel a hard surface and tough inner core.

PREVENTS LOST HOLES

New HI-LEED design keeps mating parts snug—rods won't uncouple in the hole or while pulling out. Other thread forms may not hold a tight connection and many rod strings have been lost in the hole while pulling out with rotation on.

Drillers who have used this unique and revolutionary Gardner-Denver thread design are enthusiastic about its convenience and economy. Give it a try on your own rock drills—you'll soon see why. Call your Gardner-Denver drill steel specialist, or write for new bulletin on HI-LEED steel.



EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

ENGINEER'S FIELD REPORT

PRODUCT RPM DELO OIL

FIRM C. H. LAWSON, INC.

Using RPM DELO Oil heavy-duty engines outlast equipment



C. H. Lawson, Inc. operates 78 pieces of road building equipment ranging from new to 15 years old, all using RPM DELO Oil. Only one engine has ever required major overhaul and that was not due to lubrication. Firm's chief mechanic, E. C. Miller, says,

"RPM DELO Oil has been used exclusively in all our heavy duty engines since 1944. In many cases, it has enabled engines to outlast the equipment." Euclid Earth Mover (above) gets a push from a bulldozer to provide extra traction in wet earth.



TD 24 International (left), one of firm's 12 bulldozers, helps clear the way for a Route 50 by-pass at Riverdale, Maryland. This two year old tractor has operated more than 4,000 hours without engine repairs. Company owner, C. H. Lawson (right), reports that RPM DELO Oil keeps the engines in his equipment in such good shape that—regardless of operating conditions—they average approximately 4 years or 10,000 hours service before even minor repairs are required.



TRADEMARK "RPM DELO" AND DESIGN
REG. U.S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey

Why RPM DELO Oils reduce wear—prolong engine life

- Oil stays on engine parts—hot or cold, running or idle
- Anti-oxidant resists lacquer formation
- Detergent keeps parts clean
- Special compounds prevent corrosion of bearing metals
- Inhibitor resists crankcase foaming



For More Information or the name of your nearest distributor, write or call any of the companies listed below.

STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA COMPANY, Denver 1, Colorado

By contrast, the states are equally divided between increasing and decreasing awards for 100% state-financed projects. Twenty-three plan to let more, while 22 plan to award less than they did in '59.

More contract maintenance should be available in 1960 than

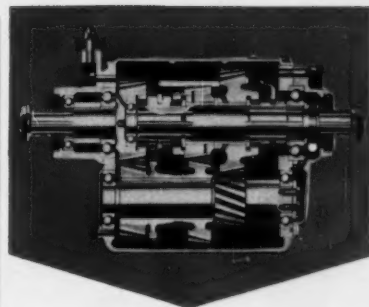
'59, though the planned 6% increase to \$64.4 million in contracts planned is overshadowed by the 8% increase to \$730 million in force-account maintenance plans. Thirty-five states expect to let part of their 1960 maintenance work by contract and most will increase it.

Planning Ahead for Highways & Bridges

Reports from State Highway Officials, based on Federal Aid now in prospect under existing legislation

STATE	Actual 1959	1960	\$ Millions — 1961	1962	1963	1964	1965
U. S. TOTAL	399.2	4,320.7					
NEW ENGLAND	215.2	289.5					
Maine	15.1	20.1	20.0	21.0	24.0	25.0	28.0
New Hampshire	19.4	23.0	24.0a	na	na	na	na
Vermont	31.2	24.1	27.0	27.0	27.0	27.0	27.0
Massachusetts	90.9	175.0	220.0	230.0	200.0	na	na
Rhode Island	5.3	13.3	11.9	15.9	16.6	16.9	18.0
Connecticut	53.3	34.0	132.0	na	na	na	na
MIDDLE ATLANTIC	433.9	690.5					
New York	226.0	300.0	300.0	300.0	300.0	300.0	300.0
New Jersey	60.6	101.0	113.0a	na	na	na	na
Pennsylvania	62.2	175.0	187.0	186.0	186.0	186.0	186.0
Maryland	54.5	67.0	65.0a	78.0a	78.0a	78.0a	78.0a
D. C.	21.5	30.3	31.4	35.1	37.0	37.0	35.0
Delaware	9.0	17.2	24.0	25.0	27.0	30.0	35.0
SOUTH	744.1	913.4					
Virginia	92.0	140.0	160.0	na	na	na	na
West Virginia	29.0	35.2	na	na	na	na	na
North Carolina	60.0	60.0	60.0	na	na	na	na
South Carolina (b)	66.8	52.8	55.0	55.0	55.0	55.0	55.0
Georgia	64.1	100.0	100.0	110.0	105.0	105.0	110.0
Florida	112.6	120.0	na	na	na	na	na
Alabama	63.0	81.0	100.0	100.0	100.0	100.0	100.0
Mississippi	47.3	53.4	53.0	53.0	53.0	53.0	53.0
Louisiana	88.1	90.0	100.0	90.0	90.0	90.0	90.0
Kentucky	62.8	72.0	na	na	na	na	na
Tennessee	58.3	109.0	107.2	107.2	108.0	108.0	108.0
MIDDLE WEST	768.0	906.1					
Ohio	282.2	295.0	260.0	260.0	260.0	260.0	260.0
Indiana	80.4	71.0	71.0	71.0	71.0	71.0	71.0
Illinois	204.5	202.0	200.0	200.0	na	na	na
Wisconsin	69.4	63.1	62.0	61.0	61.0	60.0	60.0
Michigan	131.5	275.0	225.0	130.0	105.0	105.0	105.0
MISS. TO ROCKIES	832.8	947.1					
Minnesota	82.5	68.0	69.0	70.0	71.0	72.0	73.0
Iowa	72.0	83.0	84.5	86.4	86.3	86.3	na
Missouri	74.4	128.5	93.0a	100.0a	100.0a	100.0a	100.0a
Arkansas	41.0	40.0	42.0	44.0	45.0	45.0	45.0
North Dakota	35.6	30.5	33.0	36.0	40.0	na	na
South Dakota	36.3	34.3	na	na	na	na	na
Nebraska	32.2	48.0	40.0	41.0	42.0	43.0	44.0
Kansas	50.9	55.0	60.0	60.0	62.0	70.0	72.0
Oklahoma	27.0	50.5	52.0	54.0	56.0	57.0	57.0
Texas	281.5	253.0	280.0	280.0	280.0	280.0	280.0
Montana	20.2	43.0	na	na	na	na	na
Wyoming	24.1	39.3	33.0	33.0	33.0	33.0	33.0
Colorado	33.2	42.0	42.0	na	na	na	na
New Mexico	21.8	32.0	33.0	35.0	37.0	39.0	41.0
FAR WEST	405.2	574.1					
Idaho	17.3	30.4	22.3	24.6	26.8	29.1	31.4
Utah	28.7	37.1	46.0	na	na	na	na
Arizona	36.0	39.0	39.0	38.0	38.0	38.0	38.0
Nevada	7.4	25.0	25.0	22.0	30.0	34.0	34.0
Washington	47.3	60.0	60.0	65.0	65.0	65.0	65.0
Oregon	37.3	55.0	43.0	46.0	44.5	47.5	47.5
California	220.0	280.0	300.0	310.0	315.0	320.0	326.0
Alaska No IS	4.1	32.4	38.0	40.0	40.0	40.0	40.0
Hawaii No IS	7.1	15.2	2.1c	4.9c	5.0c	7.7c	1.8c
Puerto Rico No IS	8.6	21.0	21.0	18.0	18.0	18.0	18.0

• IS interstate funds • na not available • a fiscal year • b incl right-of-way, engineering and contingencies • c Program may be accelerated depending on legislation now in Congress to permit allocating interstate funds



Specify

FULLER

Specify the

MODEL

For heavy duty

trucks and tractors specify the

FULLER '92 SERIES

3-SPEED AUXILIARY

- High capacity
- Widest range of ratios
- Top-mounted power take-off optional
- Low initial cost, reduced maintenance
- Available from all truck manufacturers on specification

92 SERIES (Heavy-Duty) RATIOS

MODEL	SPLITTER RATIOS		DEEP REDUCTION
	High	Inter- mediate	
3-A-92	.74	1.00	2.09
3-B-92	.84	1.00	1.24
3-C-92	.75	1.00	2.64
3-D-92	.75	1.00	1.24
3-E-92	.84	1.00	2.09
3-F-92	.84	1.00	2.64
3-G-92	1.00	1.327	2.09
3-H-92	1.00	1.327	2.64



Specify

Specify the MODEL

FULLER MANUFACTURING COMPANY
(Transmission Division)
KALAMAZOO, MICHIGAN
Subsidiary EATON Manufacturing Company

SOME BIG CONTRACT AWARDS OF THE MONTH

Williams Bros. Construction Co., Tulsa, Okla. Construct 1,749 mi of pipe line for propane, butane, and natural gas from southeastern New Mexico to St. Paul, Minn. and Madison, Wis. Mid-American Pipeline Co., Katy Bldg., Dallas, Tex. \$45,627,000.

Bethlehem Steel Co., New York, N. Y. Erect the Staten Island Tower for the Narrows Bridge at the entrance to New York Harbor. Triborough Bridge and Tunnel Authority, Administration Building, Randalls Island, New York 35, N. Y. \$23,413,900.

A. L. Jackson & Co., Chicago, Ill. Construct an office building at State St. and Wacker Dr. in Chicago, Ill. United Insurance Co. of America, 1313 S. Michigan Ave., Chicago, Ill. \$22,000,000.

H R H Construction Co., New York, N. Y. Erect a 19-story hospital at 33rd St. and First Ave.

in New York City. New York University - Bellevue Medical Center, 550 First Ave., New York 16, N. Y. \$14,943,000.

Manhattan Construction Co., and **P. G. Bell Construction Co.** both of Houston, Tex. A joint venture to construct a 26-story hotel-office building in Houston, Tex. Lincoln-Liberty Life Insurance Co., 1508 Milam St., Houston, Tex. \$12,500,000.

Sollitt Construction Co., South Bend, Ind. General construction for the upper dam of the Smith Mountain Hydroelectric Project on the Roanoke River near Roanoke, Va. Appalachian Power Co., 40 Franklin St., Roanoke, Va. \$11,500,000.

Nello L. Teer Co., Inc., Durham, N. C. Grade and pave 2.5 mi of highway including six bridge structures and seven concrete culverts near Alexandria, Va. State Highway Dept., 1221 E. Broad St., Richmond, Va. \$11,068,027.

H. B. Zachry Co., San Antonio, Tex. Construct the Twin Buttes

Dam on the South Concho River near San Angelo, Tex. Bureau of Reclamation, Dept. of the Interior, Washington 25, D. C. \$11,836,428.

Slattery Contracting Co., New York, N. Y. Construct ramps, elevated viaduct, and street level roadway for 14.2 mi of the Gowanus Expressway in New York City. Dept. of Public Works, State Office Building, Albany, N. Y. \$10,309,403.

Paschen Contractors, Inc., Chicago, Ill. Erect the first stage of the William Green Housing Project in Chicago, Ill. Chicago Housing Authority, 608 S. Dearborn St., Chicago, Ill. \$9,118,000.

Griffith Co., Los Angeles, Calif. Construct 1.1 mi of an eight-lane viaduct for the Santa Monica Freeway in Los Angeles, Calif. State Division of Highways, 120 Spring St., Los Angeles, Calif. \$8,737,889.

Peter Kiewit Sons' of Canada Ltd., Vancouver, B.C. and **A. Johnson Construction Co. Ltd.**,

continued on page 60

STABILIZE
BASE
THE
ROME WAY



ROME

YOUR ROME DEALER
IS YOUR
CATERPILLAR DEALER



HEAVY-DUTY LAND CLEARING,
TILLAGE AND
LAND PREPARATION EQUIPMENT

Rome Disk Plowing Harrow pulverizes, blends, compacts, bonds lifts

See the action of a Rome Disk Plowing Harrow as it cuts and levels a fill: note how it churns and pulverizes lumps, blending materials together, cutting deep into the subbase to bond the lift and base together. Look at how flat and smooth the fill is after the disk has done its work. The Rome way is the most efficient method ever devised for stabilizing and blending base on roads, dams, airports, fills, construction jobs.

Other uses include blending in-place materials like soil cement into a compact, homogeneous mixture—drying out a muddy cut or haulroad—cutting and chopping brush, small trees.

There's a size and type to match your specific needs. Call your Rome-Caterpillar Dealer today! Rome Plow Company, Cedartown, Ga.





Vibrating shoes consolidate fast, deep for profitable single-course construction!

100% consolidation of subbase materials is often possible in only one pass with a Lima Roadpacker. High-speed vibrating action fills voids, keying materials to depths of 12 in. and more.

Fewer courses, passes

Single-course construction with a Roadpacker is more profitable, because you need lay fewer courses and make fewer passes than with less efficient consolidation equipment.

Working widths can be varied up to 13 ft., 1 in. End shoes fold up for highway travel at speeds to 30 mph. Roadpacker works at speeds from 20 to 95 fpm; consolidates up to 600 tons per hour. Works forward or in reverse, never shoves material. Self-propelled; gasoline or diesel engine. Easy to operate; good visibility. Optional widener

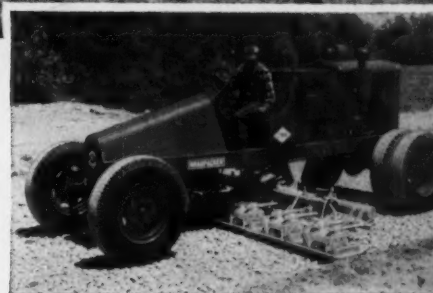
attachment is available to replace trench rollers.

Lima Roadpackers are easy to maintain. Hydraulically operated vibratory shoe mechanisms are completely sealed from abrasive dust; maintenance free.

Super model available

Lima also offers a new 12-shoe *Super* Roadpacker for extra-high-production consolidation on large construction jobs such as superhighways, air bases and earth-fill dams. It has more than double the consolidating capacity of any multiple shoe vibratory machine!

Learn more about the profit-making features of Lima Roadpackers. See your nearby Lima distributor today or write to Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.



MODEL D ROADPACKER—International favorite for high-speed, high-production consolidation on highway and airport construction.



NEW S-YD. LIMA LOADER digs, scoops, swings and loads from stationary position; no waste motion. Fast, economical way to handle bulk materials.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

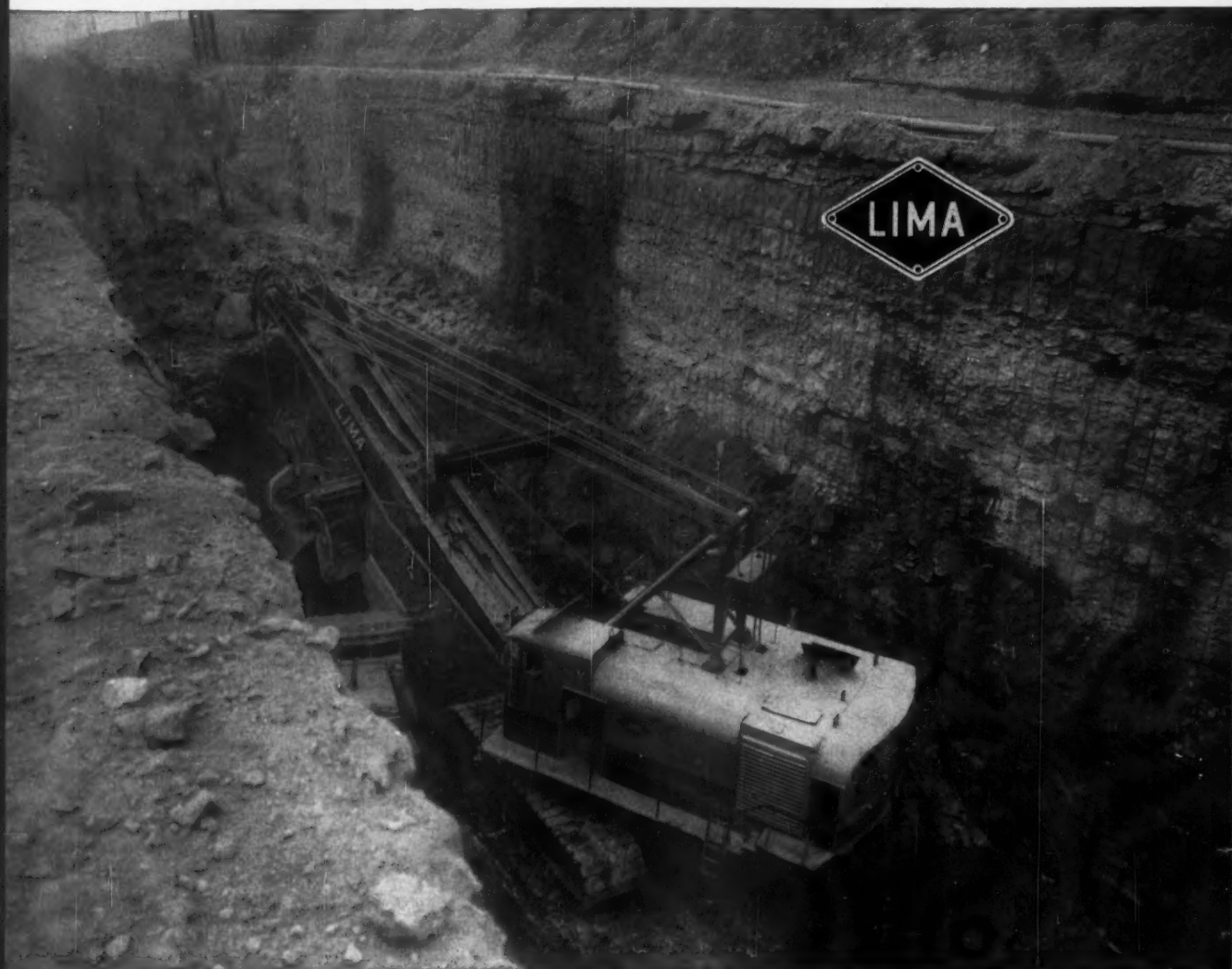
LIMA Construction Equipment Division, Lima, Ohio
BALDWIN · LIMA · HAMILTON

Shovels • Cranes • Draglines • Pullshovels • Roadpackers • Crushing, Screening and Washing Equipment

6024



HOW 23 LIMAS HAVE HELPED BUILD NIAGARA POWER PROJECT



Herculean task begins as this 6-yd. Lima shovel starts excavation for 2,000,000-kw Niagara Generating Plant—scheduled for mid-1962 completion. It's one of five giant Lima Type 2400's assigned the task of moving almost 10 million yards of rock. For the big, tough jobs on any project, you're almost certain to find Limas chosen to keep work on schedule.



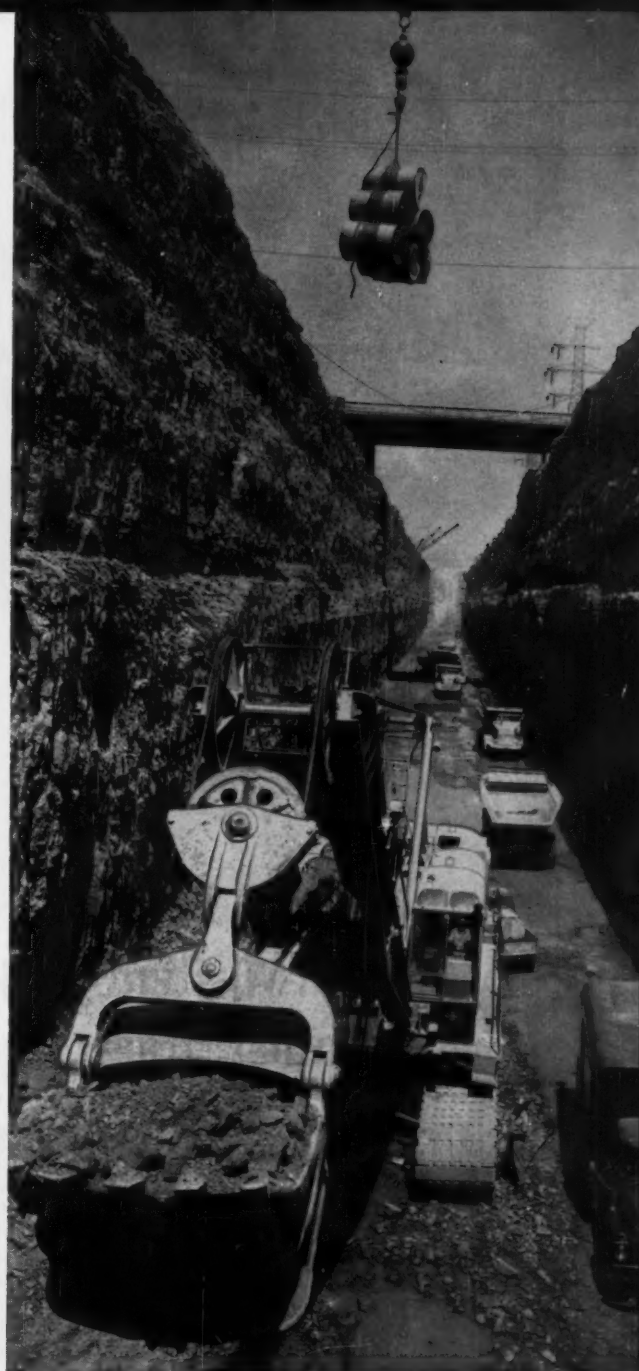
Millions of yards moved and many months later, the Limas are still at it—whittling down the 314-ft. cliff and forcing it back 300 ft. from the Niagara River along a front of 1840 ft. Lima dependability and consistent high output can be directly traced to superior quality of design, workmanship and materials. All bearings above machinery deck are anti-friction roller bearings; heat-treated alloy shafts are splined; induction hardening of all wearing parts increases parts life; steel bases are cast in one piece.



Lima dragline (top) begins excavation at intake site above falls. Water will be channeled from intake to reservoir and generating plant via 22,000-ft. underground conduit, 46 ft. wide, 66 ft. deep. Limas easily convert to shovels, cranes, draglines, pullshovels.



110-ton Lima crane (above) makes easy work of setting concrete form in place. Same rig later pours concrete. Booms of two Lima Type 1250-SC Cranes form archway over Niagara's "big ditch." Booms are of alloy steel with tube lacing spliced to angles for greater strength.



Limas demonstrate ability to outperform other equipment because they are better built; deliver years of trouble-free service. That's why four Niagara contractors are using a total of 23 Limas! Why not look into Limas for your jobs — crawler shovels to 8 yd.; cranes to 140 tons, 75 tons on rubber; draglines variable. See your nearby Lima distributor for facts, figures or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

LIMA Construction Equipment Division, Lima, Ohio
BALDWIN · LIMA · HAMILTON

Shovels • Cranes • Draglines • Pullshovels • Roadpackers • Crushing, Screening and Washing Equipment



6036



A-W grader builds service road over desert sand for highway project earth movers.

Austin-Western works where other graders can't!

Only Austin-Western Super Series graders have 6-wheel drive and 6-wheel steering. These two features permit an A-W grader to work with heavy loads where other makes can't even operate!

A-W walks right in

Silva & Hill Construction Co., South San Gabriel, Calif., report, "On a recent job along the Santa Ana River, we had to grade heavy sand. Our Austin-Western Super 200 walked right through the sand with a heavy load on the blade. It had plenty of traction. All-wheel drive made the difference.

"Hydraulic control is another good feature. It allows the operator to instantly switch from back sloping to fine grading with the flick of a lever."

Rear steers too

It's virtually impossible to get an A-W stuck—in sand, snow, mud or ice. With power up front and the ability to steer the rear too, an operator can carry a full load on his blade without sidethrust while he works forward in a straight line.

The many operational advantages of Austin-Westerns help spell out a story of increased job profits through dependable, efficient operation with low maintenance costs. A-W graders are available in 6-wheel Super models or 4-wheel Pacers in a wide range of weight classes, from 16,000 to 30,000 pounds, and power ranges, from 106 to 143 horsepower. Why not get all the facts. Call your A-W distributor or write to us now!

Austin-Western

CONSTRUCTION EQUIPMENT DIVISION, AURORA, ILL.

BALDWIN • LIMA • HAMILTON

Power graders • Motor sweepers • Road rollers • Hydraulic cranes



CONTRACTS AWARDED... *continued*

and **Poole Construction Co. Ltd.**, both of Regina, Sask. A joint venture to construct the downstream portion of tunnels for the South Saskatchewan River Dam Project. Prairie Farm Rehabilitation Administration Motherwell Bldg., Regina, Sask. \$8,064,157.

L. E. Dixon Co., & W. E. Kier Construction Co., San Gabriel, Calif. A joint venture to erect technical facilities at Lemoore Naval Air Station in Lemoore, Calif. Public Works Office, 12th Naval District, San Bruno, Calif. \$7,694,000.

H. L. Coble Construction Co., Greensboro, N.C. Construct a manufacturing plant in Danville, Va. P. Lorillard Co., 220 E. 42nd St., New York, N. Y. \$7,000,000.

Marvin E. Collins Co., El Cerrito, Calif. Erect a 40-acre shopping center to include a professional building, apartments and recreation center in Antioch, Calif. Delta Fair, Antioch, Calif. \$7,000,000.

Vinnell Constructors, Los Angeles, Calif. Construct a baseball stadium for the Los Angeles Dodgers Baseball Club in Los Angeles, Calif. Los Angeles Dodgers, Inc., 824 Wilshire Blvd., Los Angeles, Calif. \$7,000,000.

H. L. Coble Construction Co., Greensboro, N. C. Erect a 470 unit housing project at Blytheville Air Force Base in Blytheville, Ark. Base Procurement Office, Blytheville Air Force Base, Blytheville, Ark. \$7,669,800.

Foster Construction Co., & Williams Bros., Tulsa, Okla. Dredging and associated work to widen Empire Reach at the Panama Canal in the Canal Zone. Panama Canal Co., Balboa Heights, Canal Zone. \$6,353,000.

Foster-Marsch Corp. & Manderbach Construction Co., San Diego, Calif. A joint venture to construct an apartment building and home for the aged in San Diego, Calif. Pacific Homes Development Co., 5250 Santa Monica Blvd., Los Angeles, Calif. \$5,997,000.

George A. Fuller Co., New York, N. Y. Construct a 10-story office

building in Hartford, Conn. Travelers Insurance Co., 700 Main St., Hartford, Conn. \$5,800,000.

Robert H. Smith & Co., Houston, Tex. Erect a hotel with associated recreational facilities in Houston, Tex. Loe Barshop-Holcombe Properties Inc., 1500 S. Zarzamara St., San Antonio, Tex. \$5,750,000.

Depot Construction Corp., New York, N. Y. Construct a Police Academy and replacement facilities for two police precincts in New York City. Dept. of Public Works, Room 2200, Municipal Building, New York 7, N. Y. \$5,475,500.

John McShain, Inc., Baltimore, Md. Erect four apartment buildings and two residence halls at West Virginia University, Morgantown, W. Va. West Virginia Board of Governors, Morgantown, W. Va. \$4,384,000.

J. L. Coe Construction Co., Charlotte, N.C. Construct a 12-story office building in Charlotte, N.C. Cutter Realty Co., 201 1/2 S. Tryon St., Charlotte, N.C. \$4,000,000.

C. J. Langenfelder & Sons, Baltimore, Md. Construct section of the Jones Falls Expressway from 29th St. to Union Ave. in Baltimore, Md. Bureau of Highways, 303 Municipal Building, Baltimore 2, Md. \$3,240,439.

Western Contracting Corp., Sioux City, S. D. Complete first stage of earth work on the Big Bend Dam at Fort Thompson, S.D. \$3,043,278. Corp of Engineers, 1907 Jackson St., Omaha 2, Neb.

Conner Bros. Construction Co., Sigourney, Iowa. Erect a 50,000 sq ft manufacturing plant in Fairfield, Iowa. Rockwell-Standard Corp., 843 4th Ave., Coraopolis, Pa. \$3,000,000.

Edward J. Fuhrmann Co., Inc. West Seneca, New York. Erect a hotel in the vicinity of the Buffalo International Airport. Dynamic Enterprises, Inc., 265 Villa Dr., Buffalo, N.Y. \$3,000,000.

T. & T. Contracting Corp., 4814 Glenwood Rd., Brooklyn, N.Y. Construct 6 mi of storm sewer in areas of Bellerose and Floral Park, New York City. President of Queens Boro, Rm. 228, Boro Hall, Kew Gardens 24, N.Y. \$5,524,000.



California paving contractor says:

Liked A-W roller so well, bought two more!

"Our first A-W performed so well that we bought two more over a period of 5 years. We use them to roll both subgrade and finish courses. They are fast and efficient machines; and can deliver the 95% relative compaction required. Torque converter allows more positive control of rollers for uniform compaction. Hydraulic controls make them easy to operate. Plenty of visibility for operators to do precision jobs. The A-W rollers are well-built; maintenance has been no problem."—*Pat Regan, Exec. Vice Pres., A. J. Raisch Paving Co., San Jose, Calif.*

A-W 3-wheel rollers available in 8 to 11, 10 to 12, 12 to 14-ton models; tan-

dems 5 to 8, 8 to 12, 10 to 14 tons. Portable tandem variable between 3 1/2 to 6 tons. Vibratory Roller Compactor and Widener Attachment also available. Choice of gasoline or diesel power; torque converter with 4-speed transmission optional.

Austin-Western offers you a number of important dollar-saving features not available on many other makes of rollers. Let us prove to you the ways in which A-W rollers can increase your compaction efficiency and decrease maintenance and operating costs. Contact your nearby Austin-Western distributor or write directly to us.

Austin-Western

CONSTRUCTION EQUIPMENT DIVISION, AURORA, ILL.

BALDWIN · LIMA · HAMILTON

Power graders • Motor sweepers • Road rollers • Hydraulic cranes





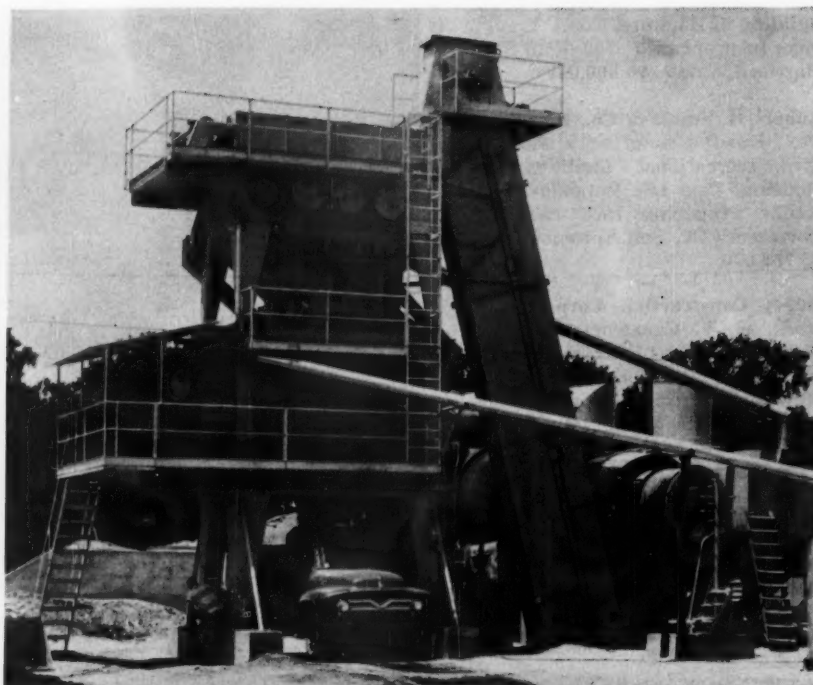
50 years of engineering experience is "built-in" today's MADSEN Asphalt Plants. That's why you can depend on MADSEN for the most modern asphalt plants in the industry...such as the

MADSEN

MODEL 391

HOT ROD

ASPHALT PLANT



"WE GET A PERFECT MIX IN 29 SECONDS"

... says J. L. Croft & Son, Inc.

SAUGUS, CALIFORNIA

"We like a lot of things about our MADSEN HOT ROD Asphalt Plant" ... says Mr. Croft, "and on a recent job on U.S. Highway 466 northwest of Mojave, California we learned about the money-making ability of this MADSEN 4000-lb. Plant. Mixing approximately 29,000 tons of Type B mix to strict California State Highway Department Specifications, we turned out 4000-lb. perfectly-mixed batches in 29 seconds. In one 8 1/4-hour day we mixed 1842 tons. We consider the MADSEN Twin-Shaft Pug Mill Mixer the fastest and most efficient mixer in the industry."

Designed to meet today's fast-moving industry, the MADSEN HOT ROD has no extras, no "trimmings"... just the essential components for fast output. Unit construction means easy set up and dismantling. Other MADSEN advantages include: fully enclosed (running in oil) gear box reduction unit, triple discharge bin gate openings (Pat. Pending), all air operation, and choice of automatic or semi-automatic operation.

See your MADSEN Distributor for the complete story on the MADSEN Model 391 HOT ROD Asphalt Plant... ask for Bulletin No. 391.



Equipment that Serves.

MADSEN maintains a complete parts stock in Los Angeles and Lima, Ohio

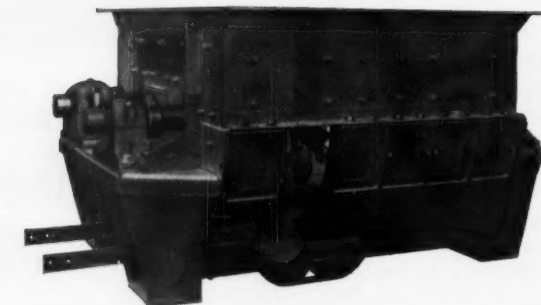


MADSEN WORKS

Construction Equipment Division
BALDWIN-LIMA-HAMILTON CORPORATION
P.O. BOX 38, La Mirada, California



BALDWIN-LIMA-HAMILTON CORPORATION
P.O. Box 1, Lima, Ohio



Faster, more thorough mixing in the MADSEN Twin-Shaft Pug Mill Mixer is due to: (1) the general contour of the mixer, (2) the patented shank design, (3) pressure mixing through the arrangement of the paddles and, (4) the extra large discharge gate.

The MADSEN Asphalt Pressure Injection System with new rotating distribution bar (Patented) injects the asphalt into the mill quickly — cuts it off sharply to further improve mixing and reduce mixing time. Precision-ground liner segments may be quickly and easily removed and installed externally without field modification.

MADSEN PRODUCTS

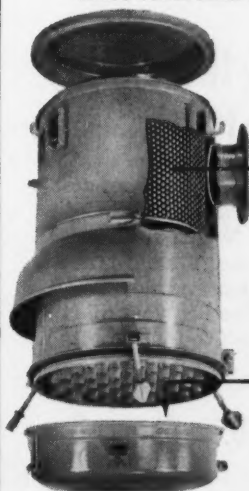
ASPHALT PLANTS • PUG MILL MIXERS • AGGREGATE DRYERS • DUST COLLECTORS • ROAD PUG TRAVEL MIX PLANTS • WEIGH BATCHERS • DUST WASHERS • FEED BUNKERS
FEED TUNNELS • ASPHALT TANKS • ASPHALT & FUEL PUMP UNITS • CONCRETE FLOAT FINISHERS FOR AIRPORTS AND HIGHWAYS • HIGHWAY-AIRPORT BASE STABILIZER PLANTS



Don't try this with an ordinary paper filter!

Most paper filters can't stand moisture or humidity...
but you can wash the Duralife filter and save money!

Donaclones clean air 10 to 20
times better than oil bath types!



Only 2% of dust
reaches Duralife
paper filter!

Embossing and
pleating provide
maximum filtra-
tion area. Con-
trolled porosity
gives 99.9% dust
removal.

98% of dust
removed here!

Cluster of Dona-
clone tubes make
up highly-effi-
cient primary cen-
trifugal cleaning
stage. Dust is
ejected into dust
cup for easy
servicing.

Washability proves 2 points

1. Moisture does not impair the performance of the Donaclone. Rain, fog, high humidity are no problem. Chemically-treated, special-formula paper is not affected.
2. Donaclones cost less to service. Filter seldom needs any attention because 98% of the dust is removed by the primary centrifugal cleaners. When it does need cleaning, you just dunk it in water and detergent... and it's like new. Replacements are mighty infrequent.

Leading equipment builders have switched to Donaclones because they protect their engines better. Install Donaclones on your equipment and get years of extra engine life. There's a dealer near you. Send coupon.

Donaldson
COMPANY, INC.

666 Pelham Blvd.
St. Paul 14, Minn.

**CHECK
AND MAIL**

- ☐ Send literature
☐ Have distributor call

Name _____

Clip and attach to your letterhead

where there's
no time
for downtime

**NYGEN-
BUILT**

GENERAL TIRES

**keep units rolling 'round-the-clock
to build on-the-job profits!**

When profits depend on constant operation, you can depend on the extra strength of the General Tire to bring you through *on time every time*. With Nygen cord construction to ward off bruise, cut and snag damage, the General Tire delivers unmatched traction and flotation, reduces down time to a minimum. Whether your next job is in sand, rock or mud, assure yourself top job profits with General Tires.

THE GENERAL TIRE & RUBBER CO. • Akron, O.

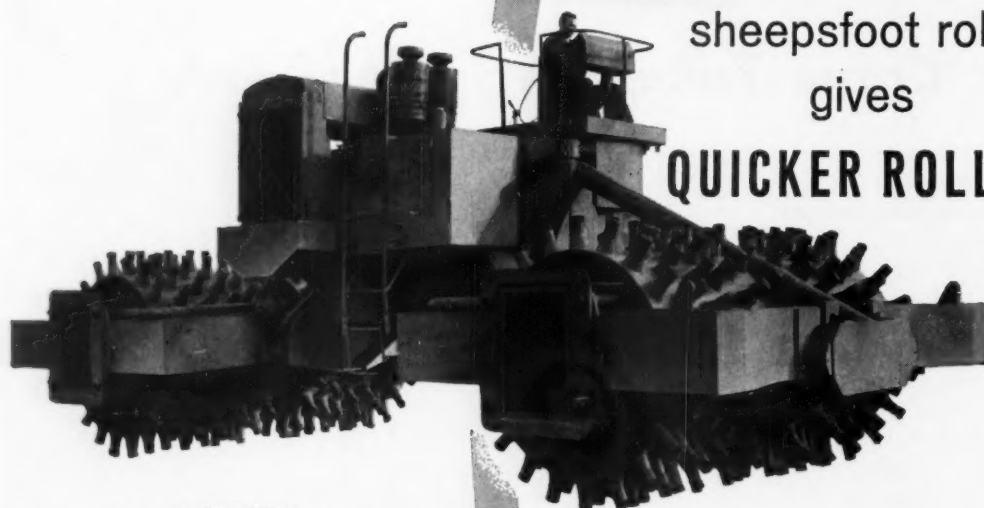


**PICTURE
OF THE
MONTH**

Truck Crane Takes Two - Story Ride

● To erect the steel for the fourth floor of a south-wing annex to Detroit's Main Library, a 30-ton Lorain truck crane hoists a 10-ton Lorain crane to the third floor, 60 ft off the ground. The 65-ft boom of the smaller crane was removed for the lift. Acorn Iron Works handled the erection this way to protect the trees around the library. The alternative would have been to block the street and erect the steel with a crane with a 200-ft boom that would clear the trees. The lift took two hours of work by a five-man crew. Erection work on the fourth floor will take four days. Then the cranes will repeat the operation on the north wing.





SWING 180° WITH REVOLVING SEAT AND CONTROL PANEL



GET "STRAIGHT AHEAD" OPERATION IN EITHER DIRECTION.

NEW self-propelled sheepsfoot roller gives **QUICKER ROLLOUT**

save 1½¢ (or more) per cu. yd.

with **SERIES M 50-55**

POWER PACKER

You'll be amazed at the *extra miles* of compacting you'll get hour after hour, day after day, with Series M 50-55 Power Packers! The reason is simple: This self-powered "sheepsfoot roller" works at a pace appreciably faster than its towed counterparts; and *you never turn around on the fill.*

More power is available for compacting because the Power Packer has to move no "idle" weight of a tow tractor. Each of its four roller drums is driven from the inside by its own

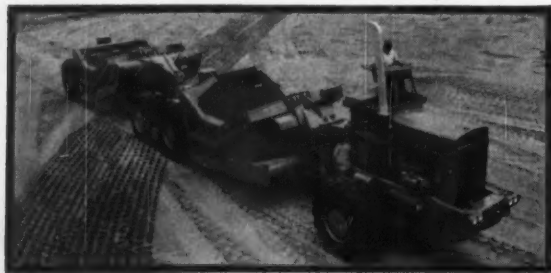
electric motor and gear reduction. A diesel-electric generating plant automatically synchronizes the rollers at any of the infinite number of speeds you can select within the range.

Then, to travel in the other direction, merely swing the rotating seat and controls 180-degrees, spin a rheostat, and you're rolling! These quick-as-a-flash starts, stops, and reverses make working tight corners, or over slopes, quick and simple.

It all adds up to more production per man hour — the surest way to stay competitive . . . and profitable. Learn how present owners are making Power Packers pay. Just let us know you're interested, and we'll send all the specifics. The address is:

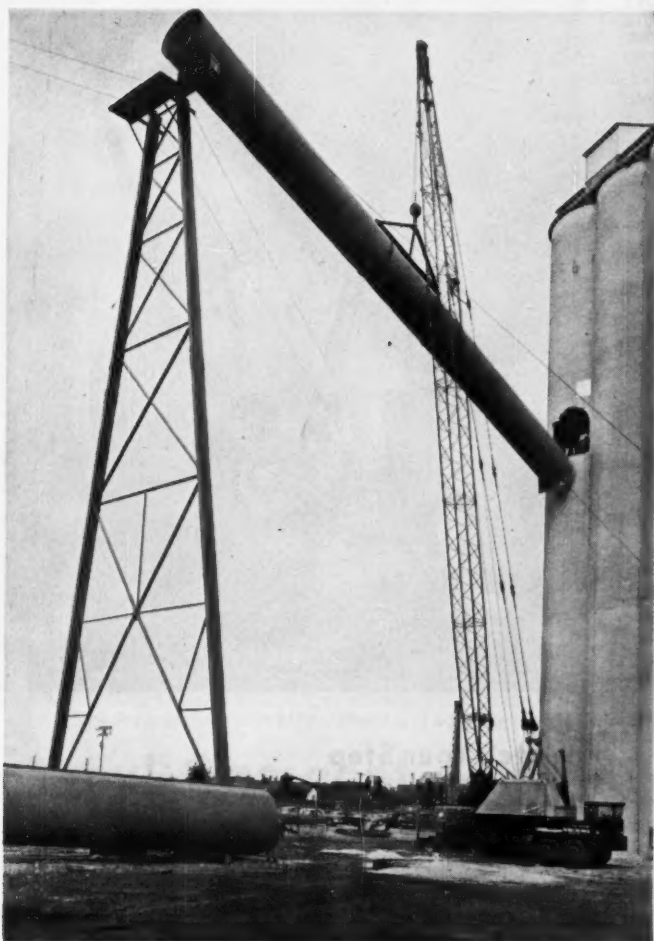
R.G. LE TOURNEAU INC

2775 S. MacArthur, Longview, Texas



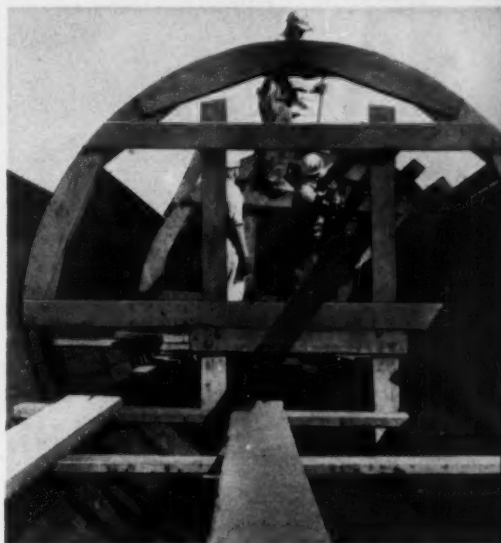
ELECTRIC DIGGER (Series L-50) is another Electric Wheel machine for contractors. It self loads 55 to 60 tons . . . drastically cuts dirtmoving cost.

Construction News in Pictures . . .



HighRiding Pipe

Close control is important in this lifting operation. Manitowoc 2900 truck crane with 130-ft tubular boom lifts an 18-ton pipe section into place at the plant of the Froedtert Malt Company in Milwaukee. This 132-ft long section and a second similar one will span the 260-ft distance between two buildings in the Froedtert plant.



Wooden Pipeline

Workmen position 3 1/2-in. thick wood staves for 10-ft water pipe for Upper Peninsula Power Co. in Rockland, Mich. The staves are made of kiln-dried, pressure creosoted Douglas Fir supplied by the Tank and Pipe Department of Simpson Engineered Wood Products Co. Pipe is expected to last at least 50 yr with no major maintenance or replacement problems.



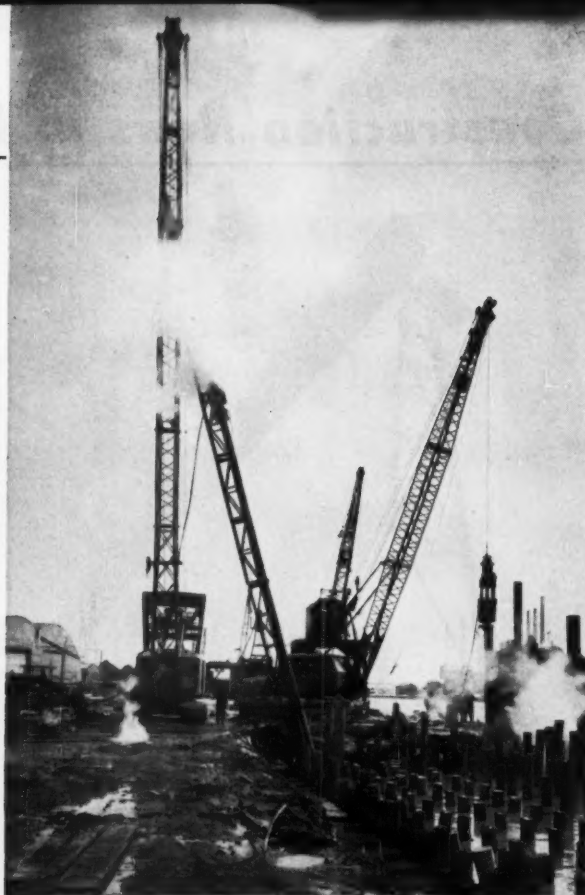
Tight Quarters

There's not much room to maneuver here. International T-340 Four-in-One pushes shot rock from Compton Avenue Relief Sewer now under construction in St. Louis. Average distance of tunnel below ground surface is 50 ft. Tunnel diameter ranges from 10 ft to 11 1/2 ft. Samuel Krause Co. of St. Louis has the contract for the tunnel.

continued on next page

On the Waterfront

Pair of pile drivers of Candler-Rusche, Inc., rushes to complete 600 ft of dock for Detroit Marine Terminals before the start of the 1960 Great Lakes navigation season. Lima 802 (left) drives wood foundation batter piles 75 ft to hard-pan strata. Bucyrus-Erie 38-B (right) drives row of steel sheet piling for a temporary cofferdam around site.



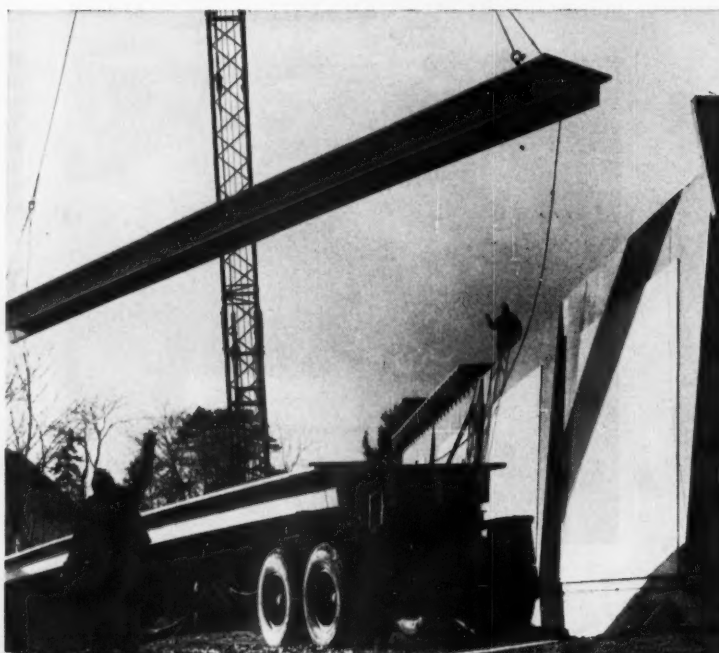
Watch Your Step

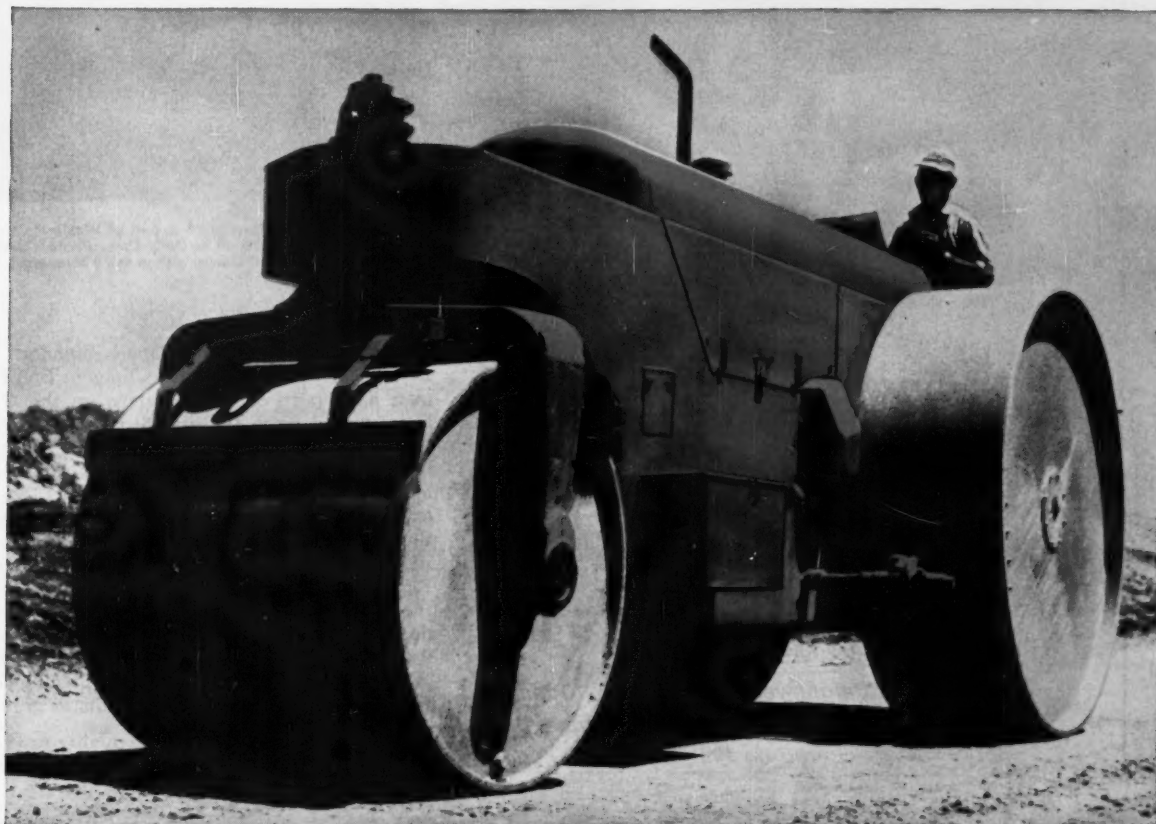
Drill crew perches on a rock cliff 500 ft above the Green River. They are preparing the upstream side of the upper section of the right keyway for the Flaming Gorge Dam. Drill rig is a Gardner-Denver Air Trac. Arch Dam Constructors have contract. Flaming Gorge Dam is part of the Bureau of Reclamation's Colorado River Storage project.

Prefab Firehouse

Crane erects a 56-ft long, pre-stressed concrete double tee beam for a fire station in New Haven, Conn. The building is a one-story T-shaped structure composed entirely of prefabricated sections. The side panels are 22 ft long, 14 ft high, with a 4-ft thick base and a 6-in. thick top. C. W. Blakeslee & Sons, Inc., fabricated the tee beams.

continued on page 72





New enamels made with M50 pigment give equipment better...longer protection...control under-the-film rusting.

New! One-coat equipment enamels with built-in rust inhibition...

keep on fighting rust even when damaged in service

Now, for the first time, you can have the rust inhibition of a primer and the durability of a finish coat, combined in a single coat of enamel.

And what is more, the paint can be tinted to match most standard equipment colors.

What gives these new one-coat enamels their exceptional properties is a unique new type of pigment, M50® basic lead silico chromate. In this pigment, the active ingredient is basic lead chromate solidly fused to an inert core. Fused lead chromate has not only exceptional rust inhibiting action, but also superior resistance to weathering.

Greatly inhibits under-the-film rust creepage, too

As you've probably noticed, when ordinary enamels are nicked or damaged in service the rust that starts spreads under the paint in no time. As this rust creepage progresses, paint flakes off to open the way for further corrosion.

Exposure tests (see photograph at right) at National Lead Laboratories show that this damage is very sharply reduced when M50 pigment is in the enamel.

Before you order paint again... look into these unusual new enamels. They can be made up by your regular paint suppliers in nearly all standard equipment colors.



How tests were made—Test enamels were applied over clean, cold-rolled auto body steel, scored, and then exposed to 5% salt fog for 300 hours. The two panels at top permit you to compare appearance of enamels after exposure. The two panels at bottom have loose paint removed so that you can compare the true extent of rust creepage under each enamel. Note also, the greater film strength shown by the M50 enamel.

M50 an **oncor** Pigment... A Development of



National Lead Company
General Offices: 111 Broadway, New York 6, N. Y.



Multi-million dollar picture. Here is part of Western's equipment lined up for inspection at Oahe Dam. Photo shows 86 trucks, 23 bulldozers and crawler pieces and 9 scrapers.

2 ways Standard Oil helps Western Contracting Corporation save on Oahe Dam job

In eight years on project, 10 million gallons of diesel fuel and gasoline have been delivered on time and when needed

Saving No. 1 F. L. "Red" Napple, Standard Oil staff engineer, and Standard Oil agent Bob Friman have been serving Western on the Oahe Dam project since the first dirt was moved in 1952. This means continuity of service that can be invaluable to a contractor. Red Napple has an engineering degree plus more than 13 years' experience in just this kind of work. Western thus has the equivalent of another engineer helping them. Napple is located at Aberdeen and Friman at Pierre, both only a few miles from the job. Western works around the clock. So does Standard. Bob Friman and his men make deliveries 24 hours a day, winter and summer. Western never has equipment down while waiting for deliveries of fuels, lubricants or greases.

Saving No. 2 Western uses only quality products — Standard's Diesel Fuel, STANDARD RED CROWN



Gasoline, STANOLUBE Motor Oils, AMOCO Lithium Multi-Purpose Grease. With these quality products, equipment is never out of service because of a motor oil or grease failure. Quality products give top level performance over a wider range of conditions. Fewer products do more jobs. This means less inventory, less chance for misapplication, less paper work, less servicing of equipment is needed. Less equipment for handling fuels, lubricants and greases is used, and less lubrication training is required.

A contractor who gets the kind of service Western is receiving on the Oahe Dam job knows he is making savings on the job. You can get such service. Call the Standard Oil office near your job wherever it is in the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company (Indiana)**, 910 S. Michigan Ave., Chicago 80, Illinois.



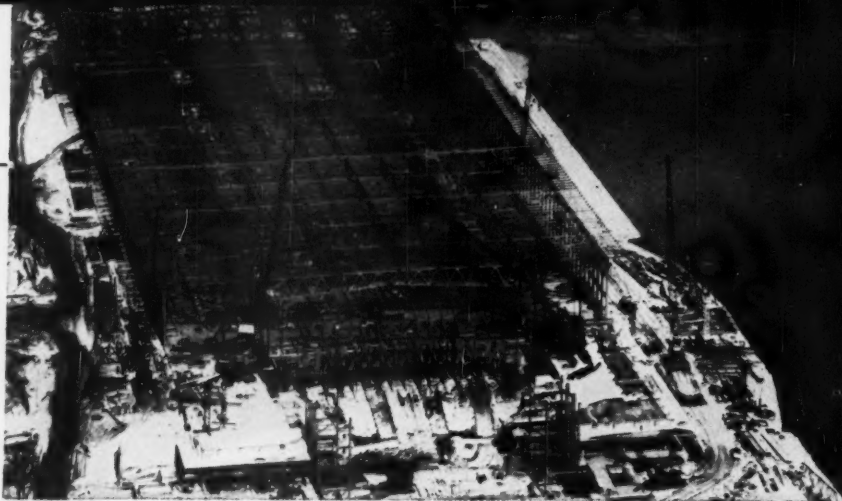
*You expect more from STANDARD
and you get it!*

Eight years on the job for each of these men—Bob Friman, Red Napple of Standard and Western's general superintendent, A. "Blackie" Blackwell. More than 90 million cubic yards of earth and shale have been moved under Blackwell's supervision. Red Napple, Standard's staff engineer, has been working with contractors such as Western for 13 years. He has an engineering degree from the University of Missouri and, has completed Standard's Sales Engineering School.



Topping Out in Chicago

Crews of U. S. Steel Co.'s American Bridge Div. hoist into place the final steel sections in Chicago's \$34-million lakefront Exposition Center. The topping out ceremony was held around the end of March. The building is 1,050 ft long, 350 ft wide, 48 ft high, and requires 7,000 tons steel. It's scheduled to open this fall. Gust K. Newburg has job.



Rubber Joints

Construction men inspect one of 24 rubber pavement joints in a pre-stressed concrete taxiway at Lemoore Naval Air Station, Calif. The joints, which expand and contract like an accordion, were developed by the B. F. Goodrich Co. Steel trusswork on each side of the ribbed rubber surface anchors the joint into the slabs on either side.

Fast Slip-Forming

In Waikiki, Hawaii, crews put up a 14-story hotel elevator shaft in 16 days using slip forms and precast beams. Hydraulic jacks climbing up metal rods moved the forms at a one-floor-a-day rate. Elimination of normal formwork was a big asset, because construction boom in Hawaii has caused carpenter shortage throughout the area.



NOW...430HP POWER B 'PULL*

All LW Distributors
recently received this
important message:

WESTERN UNION TELEGRAM

CLASS OF SERVICE

This is a fast message
unless its deferred char-
acter is indicated by the
proper symbol.

SYMBOLS

DL=Day Letter

NL=Night Letter

LT=International
Letter Telegram

1201

The filing time shown in the date line on domestic telegrams is STANDARD TIME at point of origin. Time of receipt is STANDARD TIME at point of destination

ATTN: ALL LW DISTRIBUTORS:

NEW 430 HP B TOURNAPULL NOW IN FULL-SCALE
PRODUCTION. YOU CAN BEAT THEM ALL ON

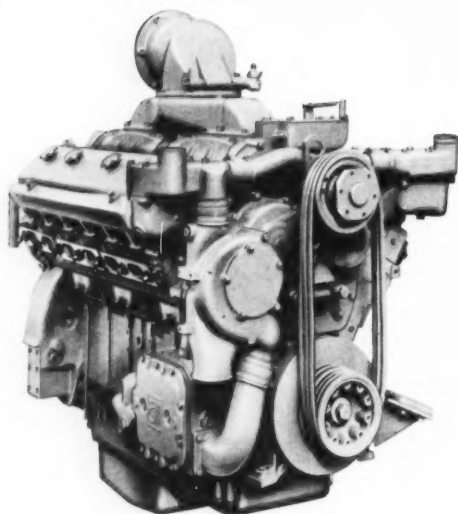
LOWEST-NET-COST-PER-YARD OR ANY OTHER BASIS. OFFER TO
DEMONSTRATE ANYWHERE, IN ANY CONDITIONS, AGAINST ANY
OTHER SCRAPER. YOU HAVE A WINNER=

LETOURNEAU - WESTINGHOUSE CO
PEORIA ILLINOIS=



more power
more production
more profit

*Trademark



12V-71 GM engine is a 2-cycle, 12-cylinder unit producing 430 horsepower at 2100 rpm, maximum torque of 1210 ft.-lb. at 1200 rpm.

NEW POWER!

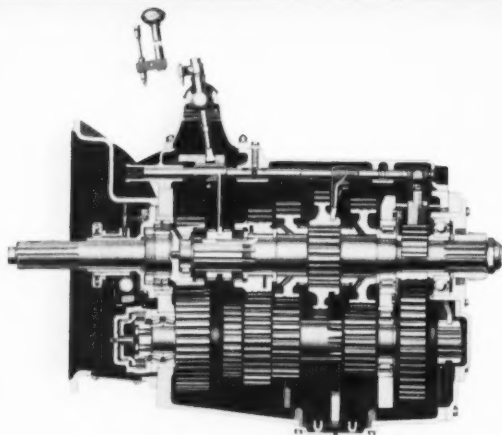
**430 HP: to lick ANY
job condition**

NEW SPEED!

**31.7 MPH + 2-speed steer
for more cycles per hour**



**V POWER
B'PULL**



Easy-shifting Fuller L-1550 with LW High and Low Range is rugged, reliable; offers 10 speeds to 31.7 MPH, self-lubrication, pressure-filtration.

NEW CAPACITY!

**23 yds struck, for more
pay-yardage per shift**

NEW STRENGTH!

**Super-sized final drive
for low upkeep, long life**

Standard engine on the B Tournapull® is now the General Motors GM 12V-71, producing 430 horsepower at 2100 rpm. That's **POWER!** Power to pick up heaping payloads fast, no matter how tough the material. Power to get out of the cut *fast*, no matter how steep the grade. Power to *accelerate* faster, to chop off *minutes* from haul-time, and to return at *top-rated* speed.

Best power-to-weight ratio in its class

Every "horse" on the new V-Power "B" has to power only 320 lb of loaded weight. That compares to an

average of 390 lb per horsepower among other single-engine scrapers in its size-class! You also get the best horsepower-per-struck-yard rating of any single-engine scraper on the market today. The V-Power "B" gives you 18.7 HP per yard, compared to an average of 16.2 among seven other scrapers in its range.

Even "hotter" than the V-Power "C"

In the *medium*-sized scraper range, the LW V-Power C Tournapull has earned the reputation as the "hottest" powered scraper of all. V-Power "B" is even "hotter!"

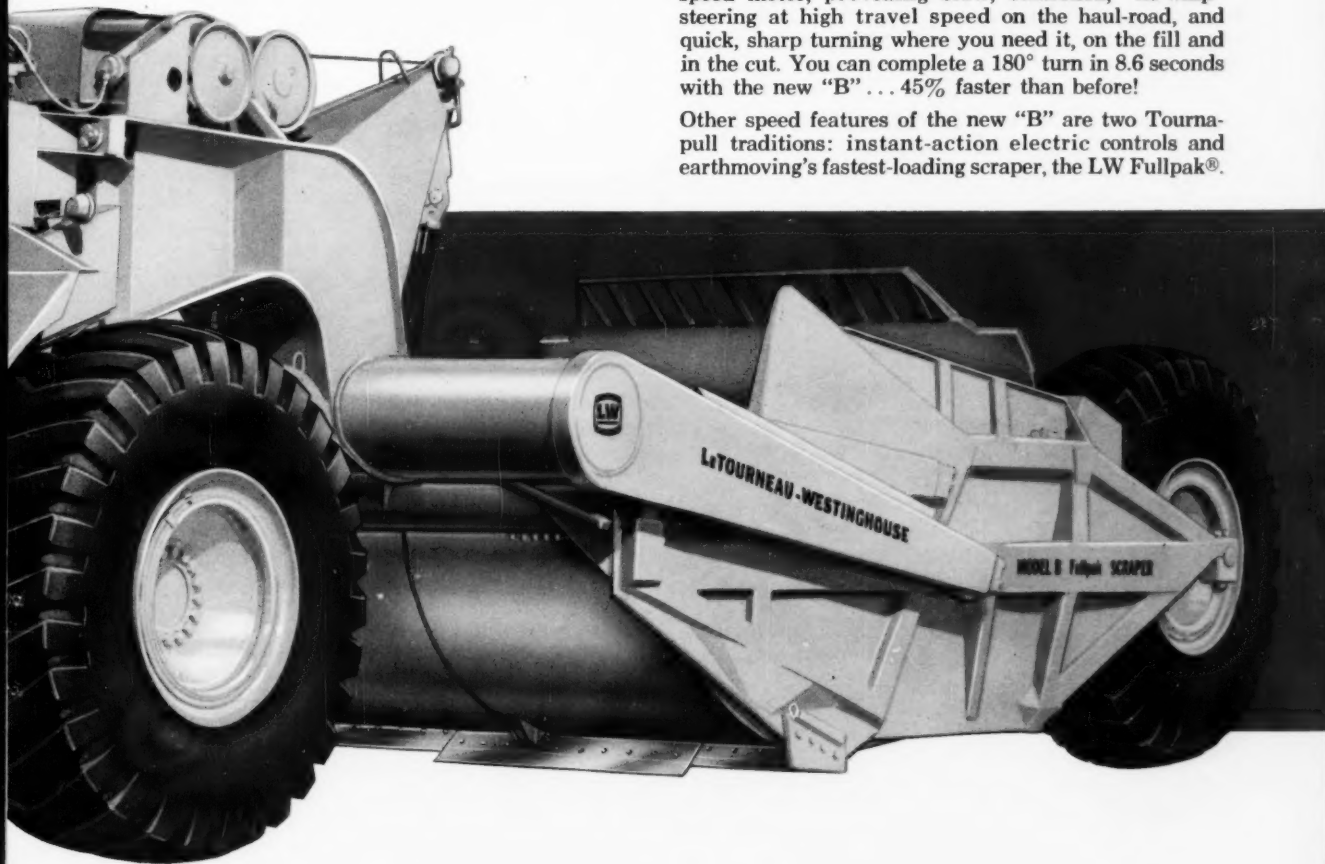
Top speed on the new V-Power B 'Pull is now 31.7 mph. That's 3.6 mph faster — almost 13% — than the average of *all* other scrapers in the "B's" size-range. And with a *10-speed* transmission, your operator works faster on every phase of every cycle. In down-shifting, for instance, instead of having to drop down to a speed 4 or 5 miles slower, he need drop down to a speed only

2 or 2.5 miles slower. And he can "skip-shift" in either direction, anytime without double-clutching.

Controlled-steer on the haul; high-speed-steer on the fill

Another new speed feature of the V-Power "B" is a high-inertia steering motor. It has the effect of a two-speed motor, providing slow, controlled, "no-whip" steering at high travel speed on the haul-road, and quick, sharp turning where you need it, on the fill and in the cut. You can complete a 180° turn in 8.6 seconds with the new "B" ... 45% faster than before!

Other speed features of the new "B" are two Tournapull traditions: instant-action electric controls and earthmoving's fastest-loading scraper, the LW Fullpak®.



Struck capacity of the V-Power B 'Pull's low, wide Fullpak scraper is now 23 cubic yards, with a heaped capacity of 29 cubic yards. Redesign of the B Fullpak

has *in no way* altered the fast-loading, quick-boil features that have made Fullpak the industry's *most productive* scraper.

Final-drive gears on the V-Power B 'Pull are now 5 1/4" wide ... a full 40% larger than those available until now. The *entire* tooth surface is now heat-treated, and

the "straight cut" design assures *maximum* load-bearing strength. No gearing in earthmoving is as simple or as strong! It's built for *rock-bottom* maintenance.



NEW TANDEM OPERATION

**Add a second scraper in minutes
...move TWO LOADS EVERY TRIP!**

With its 430-horsepower engine, the new V-Power B Tournapull lets you pull and operate *TWO* Fullpak scrapers with *one* prime-mover. After installation of the simple plug-in jacks, you can add or take off the second scraper *in minutes*. In materials where you usually add side-boards, you can now **DOUBLE YOUR CAPACITY** for the cost of a second scraper alone.

You save on operating costs: you're moving two loads with only one operator and with only little more fuel per shift.

You save on maintenance costs: you still have only one engine, one final drive, one transmission to maintain.

You save on pusher costs: you load both scrapers *faster* than one of the same total capacity (and with the *same* pusher-power you'd use for either scraper!).

You save on haul-road upkeep: pound for pound, there is *less* abuse of haul-roads with tandems than with single scrapers.



Plug-ins connect electricity and air-lines to second scraper. When these are connected, and king-bolt inserted into hitch, second scraper is ready for action!



Rugged universal-swivel hitch is pivoted over rear-axle of front scraper. You can perform any maneuver possible with single scrapers, with no jack-knifing. U-turns take only 20 to 25% more space than single units.

**V-Power B 'Pulls are AVAILABLE NOW
At your LeTourneau-Westinghouse Distributor**

Every LW Distributor is now ready to:

1. Give you full details on the V-Power "B", biggest profit-builder in earthmoving history.
2. Arrange for you to see one of these powerful units *at work*.
3. Take your order for prompt delivery, to your work-area... under terms that are as good as, *or better*, than you can get on any other major piece of earthmoving machinery.

We suggest you see *your* LW Distributor soon... to see how quickly you can start adding to your profits with the V-Power "B".



LETOURNEAU-WESTINGHOUSE COMPANY
PEORIA, ILLINOIS
A Subsidiary of Westinghouse Air Brake Company
Where quality is a habit

4500 sq. ft. per hour... That's TAMPING, brother!



Handle isolated
from vibration

Special fuel
pump carburetion —
operates at any
angle



... That's the kind of tamping that packs profit into paving jobs. These Stow tampers work faster, more efficiently compacting granular soil in trenching, backfill, sub-bases, foundations. Perfect for black-topped surfaces and for preparing pavement patches.

Precision engineered for top performance, the Stow T-18A tamper coordinates the engine stroke with the vibrator stroke to deliver maximum impact (2200 lbs.) to the tamping surface; is designed to propel itself along at speeds up to 50 feet per minute... while it tamps more than 4500 sq. ft. per hour!

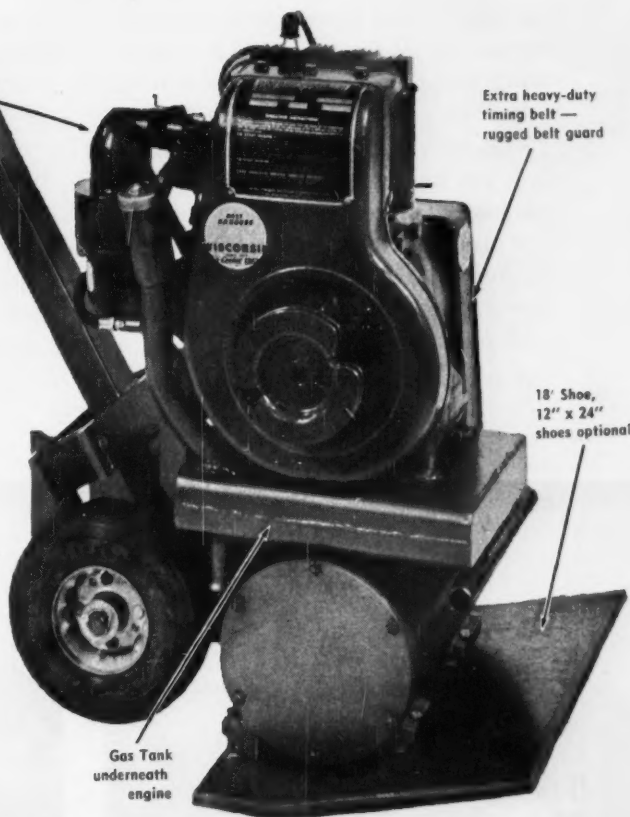
And talk about trouble-free...

The Stow Tamper is powered by a Wisconsin easy-start engine... equipped with special fuel pump to insure efficient engine performance in all operating positions. And here's a maintenance note: gas tank is mounted underneath the engine for maximum rigidity... less wear and tear!

Like we said... "That's tamping!" Try this revolutionary Stow Tamper on your next job. Your local distributor will be glad to arrange an on-the-job demonstration!

Remember Stow T-18A Tamper compacts FASTER, MORE EFFICIENTLY, WITH LESS WEAR AND TEAR.

Call your nearest Distributor or send in the coupon **TODAY!** →



Extra heavy-duty
timing belt —
rugged belt guard

18" Shoe,
12" x 24"
shoes optional

Gas Tank
underneath
engine

STOW MANUFACTURING COMPANY
Dept. M-1 31 Shear St., Binghamton, N. Y.

Please send me Tamper Bulletin 593.

Name _____ Title _____
Company _____
Street _____
City _____ State _____

Another Standard Equipment "EXTRA" from GAR WOOD-BUCKEYE...

LIVE-ACTION HYDRAULICS

for fast, accurate, on-the-go adjustments

Exclusively from Gar Wood-Buckeye, you can get all the time-saving, money-saving advantages of precision ditcher hydraulics...at no extra cost!

Buckeye's hydraulic conveyor drive gives you five big "extras" as standard equipment...three speeds in either direction, instant conveyor control, independent conveyor control, hydraulic cushioning against shock damage and finger conveyor control.

A second hydraulic standard equip-

ment "extra"...another Gar Wood-Buckeye exclusive...the hydraulic digging wheel hoist. The operator can make accurate, on-the-go adjustments to depth and grade by raising or lowering the digging wheel completely independent of conveyor, travel or digging wheel speeds.

Your Gar Wood-Buckeye dealer can show you more standard equipment "extras" for greater production at less cost. It's worth your profit to see him soon.



GAR WOOD-ST. PAUL TRUCK EQUIPMENT offers a complete line of arm-type, under-body and front-mounted telescopic hoists, with matching bodies. The precision hydraulic system provides smooth, controlled dumping for every job requirement.



GAR WOOD TRUCK CRANES provide precision controlled power for fast, accurate spotting of heavy loads. Modern 3-shaft machinery deck design permits complete accessibility to every gear, drum, brake or clutch.



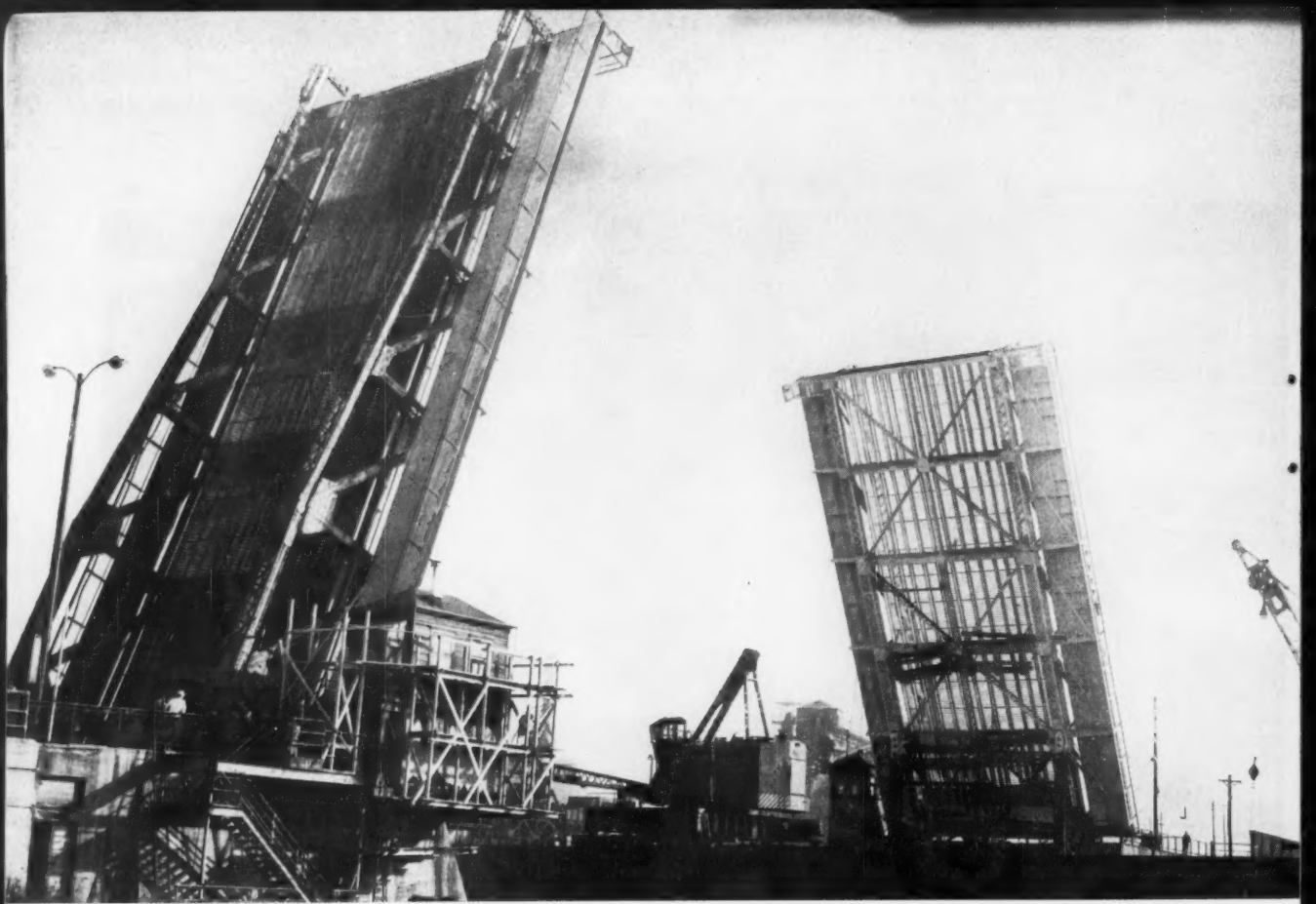
"On the move" at 10,000 feet per day on the Interstate #1 highway job south of Ashtabula, Ohio. Keith Hilaman, Norwalk, Ohio, is using two Buckeye 307's to complete 260,000 feet of drain tile ditch in record time.



GAR WOOD TRACTOR EQUIPMENT includes Tipdozers, Dozers, Rippers and front- and rear-mounted cable control units. Matched to rugged Euclid tractors and engineered for trouble-free performance under the biggest loads.

GarWood
INDUSTRIES, INC.

Findlay, Ohio • Wayne, Michigan



How to add 20 years to the life of a bridge



USS AmBridge Highway Beam Guard Rail and Posts help safeguard traffic. This rugged, flexible steel beam guard rail is highly visible. It bolts easily but firmly to steel posts and is available in 25' lengths to minimize splicing.

USS AmBridge Sectional Plate is perfect for drainage structures or underground passageways. It won't crack. Won't break. It's easy to install, because there's no need for forms. AmBridge Sectional Plate comes in a complete range of sizes.



Chicago's 92nd street bridge was built in 1914. It's a bascule bridge that averages 5,000 openings a year. Local engineers call it the city's busiest bridge. Mr. S. J. Michuda, Chicago's Chief Bridge Engineer, recently included the 92nd street bridge in his program to redeck the city's deteriorated movable bridges with steel grid flooring.

□ Mr. Michuda tells why: "Steel re-decking adds twenty years to the life of a bridge, and cuts maintenance costs to the bone. Steel grid is strong and durable . . . it's able to take the brutal pounding of heavy traffic. □ "For instance," says the Chief Engineer, "snow chains pepper our ancient bridges like shotgun pellets during the winter months. But, there's no problem with steel grid flooring. It can't break up." □ Steel grid flooring greatly reduces dead load—permits a bridge to handle heavier vehicles. USS AmBridge I-Beam-Lok is a sturdy, lightweight bridge flooring. It installs easily and quickly with few traffic interruptions. The filled type is available in units 6' wide and up to 49' long, that apply directly to stringers on spans from 6' up to 8' centers. The open type is also available for spans up to 4' center. □ For specific information, write to our Pittsburgh Office. We'll send you a copy of our 32-page catalog.

USS, AmBridge and I-Beam-Lok are registered trademarks

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**American Bridge
Division of
United States Steel**



**"OKAY--next load goes
to the cloverleaf!"**



Radio control keeps everyone on the go by keeping drivers in the know!

What caused your last work stoppage? Could it have been prevented by radioing your foremen and supervisors the exact job condition—letting them send their trucks directly to areas where materials or equipment were needed immediately? How much time and money would you have saved? Take your own work. How much time can radio save you in conferring, checking, planning, and trouble shooting?

Ask a nearby Motorola 2-way radio user. Learn firsthand how you and your foremen can become more productive—saving miles and minutes with each 2-way radio message.

Why Motorola? You get highest dollar value!

1. A custom-planned system engineered to your specific requirements—Motorola assumes complete responsibility for your system.

2. The right equipment—from the world's most complete line of communications tools—Motorola has thousands of installations in every conceivable type of vehicle. 3. Unmatched reliability, proved by the majority of the nation's utilities, police, fire and transportation services—the professional buyers of 2-way radio. 4. Motorola service by factory-trained technicians from nearby maintenance centers—keeps your system at factory peak performance for long-lasting service and satisfaction. These are some of the reasons Motorola outsells all other makes combined!

Call your local Motorola Factory Sales Engineer—or write today to see how 2-way radio can most profitably serve you. For companies with operations abroad—Motorola sales and service are available in 50 countries throughout the world.



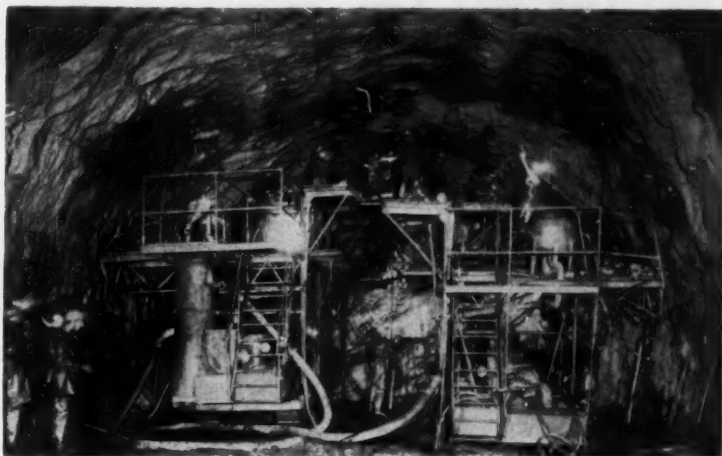
MOTOROLA 2-WAY RADIO

Motorola Communications & Electronics, Inc., 4501 Augusta Blvd., Chicago 51, Ill. • A Subsidiary of Motorola Inc.

Construction 'Round the World . . .

In Italy

Drilling platforms mounted on crawler tractors support workmen who are driving the top heading of Mont Blanc tunnel through the Alps from the Italian side. Societa Italiana per Condotte d'Acqua, contractor, is boring through brittle ground with Atlas Copco air compressors and rock drills and Sandvik Coromant integral drill steels.



In Canada

The Fleur de Lis, a \$2.7-million dredge, rests on blocks 560 ft below the original level of Black Lake, Quebec, after more than 51 months of continuous operation. The dredge pumped 75-billion gal of water at 45,000 gph and removed 31-million cu yd of overburden to uncover asbestos for American Smelting and Refining Corp. Construction Aggregates Corp. is the contractor.

In Great Britain

A backhoe and an air spade excavate clay near the cutting edge of a caisson that will become part of an upstream pier for the Forth Road Bridge near Edinburgh, Scotland. The caisson was sunk to bedrock about 104 ft below high tide level with its air chamber open. A compressor and air deck were kept handy, but never put into operation.



continued on page 86

PUT THE EARNING POWER OF A UNIT ON YOUR JOBS!



UNIT GIVES YOU THE WIDEST CHOICE OF CAPACITY, PRICE AND VERSATILITY TO MEET YOUR EXACT NEEDS

You can't do today's highly competitive jobs with obsolete equipment and stay in business. You need equipment that enables you to bid low enough to get the job—and efficient enough to turn your low bid into a profit.

The modern Unit line of excavators and cranes gives you bigger EARNING POWER because they are bigger producers on any job—faster cycling, easier operating—plus the built-in rugged dependability that keeps them on the job hour after hour, with negligible maintenance expense.

No other machines in their class perform like a UNIT, because none are built like a UNIT. No one else offers you a one-piece cast gear case with all gears, shafts and bearings operating in an oil bath; automatic traction brakes; straight-in-line engine torque converter drive; all disc type operating clutches; the liberal use of drop forged parts; heat treating on all essential components; full vision operator's cab — a combination of features you don't find even on the highest priced machines.

You'll find a UNIT is worth more when you buy it—and worth more when you sell or trade. Before you buy another excavator, compare UNIT—you'll be glad you did. Write for literature on the models shown or see your nearby UNIT distributor.

CRAWLER SHOVELS

5 CONVERTIBLE MODELS

A rugged line of power-packed machines, designed for today's competitive bidding. Fast operating, simple in design and fully convertible for maximum versatility.

Model	Shovel	Hoe	Dragline	Crane	Clamshell
513C	½ Yd.	½ Yd.	½ Yd.	5½ Ton	½ Yd.
614	½ Yd.	½ Yd.	½ Yd.	8 Ton*	½ Yd.
617	¾ Yd.	¾ Yd.	¾ Yd.	10 Ton*	¾ Yd.
1020	¾ Yd.	¾ Yd.	¾ Yd.	12½ Ton*	¾ Yd.
1220	¾ Yd.	¾ Yd.	¾ Yd.	16 Ton*	¾ Yd.

*Maximum Crane Capacity.



TRUCK CRANES

4 CONVERTIBLE MODELS

Select the size to fit your needs — all with finest engineering and exclusive quality features. Mounted on rugged carriers for dependable performance on the job and between jobs.

Model	Crane	Shovel	Hoe	Dragline	Clamshell
513T	10 Ton	½ Yd.	½ Yd.	½ Yd.	½ Yd.
1014	15 Ton	¾ Yd.	¾ Yd.	¾ Yd.	¾ Yd.
1520T	20 Ton	¾ Yd.	¾ Yd.	¾ Yd.	¾ Yd.
360T	30-40 Ton



MOBILE CRANES

2 CONVERTIBLE MODELS

Self-propelled, one man controlled and operated, for on or off highway use. Big capacities, short turning radii. Convertible for greater versatility.

Model	Crane	Dragline	Shovel	Hoe	Clamshell
357	15 Ton	½ Yd.	½ Yd.	½ Yd.	½ Yd.
1520	20 Ton	¾ Yd.	¾ Yd.



UNIT
CRANE AND SHOVEL CORP.
Milwaukee, Wisconsin

UNIT CRANE AND SHOVEL CORP.
6305 West Burnham Street, Milwaukee 19, Wisconsin

Please send complete information on the following

Unit machines. Model..... Attachment.....

Name..... Title.....

Company.....

Address.....

City..... State.....



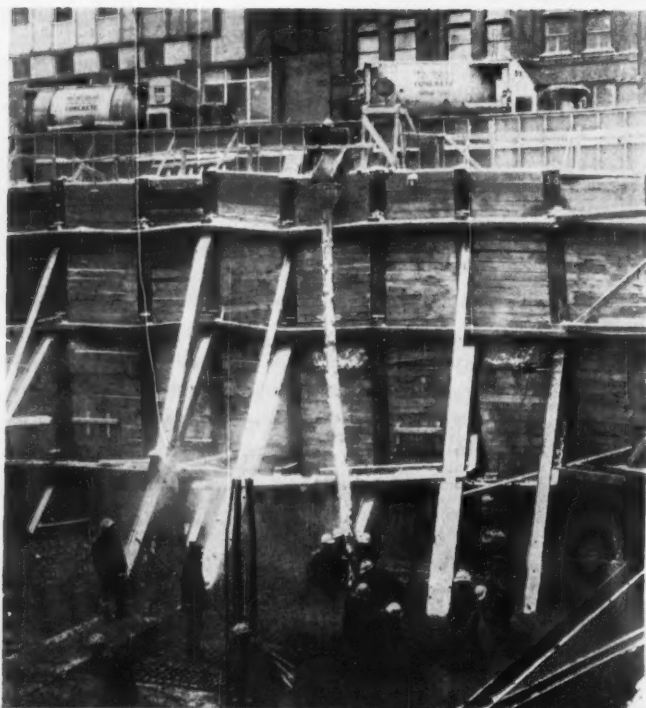
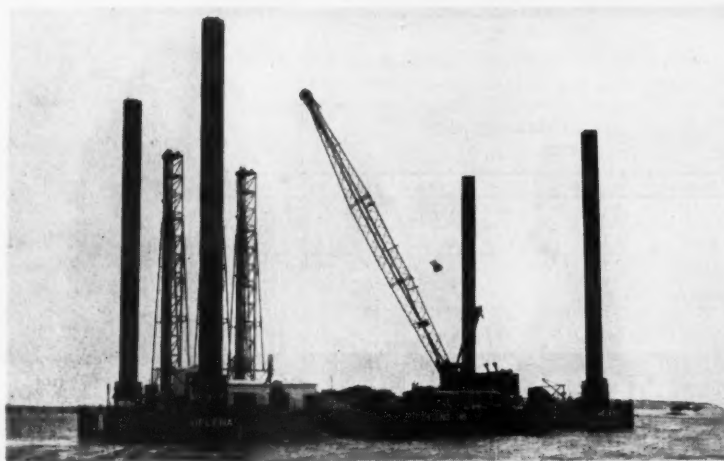
CONSTRUCTION 'ROUND THE WORLD . . . *continued*

In Mexico

A Unit model 1020 dragline and Caterpillar dozer excavate 822 cu yd of earth during a 10-hr day for a 3,330-ft long combination canal and tunnel in San Angel. Estructuras y Cimentaciones, S.A., contractor, is removing about 82,000 cu yd of soil for one section of the flood control project, working in hard tepetate conditions.

In Venezuela

Four-legged barge mounts a model 4500 Manitowoc crane with a 125-ft boom and 5½-yd clamshell plus three traveling drill towers to dig trench for a submarine pipeline. The 80x150-ft barge, designed by DeLong Corp. of New York City, raises itself out of the water by lowering hydraulically-operated legs, 8 ft in dia and 140 ft long.



In Canada

Concrete pours down elephant trunk from transit-mix truck while workmen cast a basement slab for the 34-story Canadian Industries, Ltd., building in Montreal. The structure is hemmed in on three sides, limiting access to the 50-ft deep foundation. The retaining wall consists of 14-in. soldier piles, driven 30 ft, and 3-in. sheeting.

IN 1947...UNITS #1, 2, 3, 4

IN 1960...UNIT #5

for Sewaren Generating Station

PREDRAINED BY MORETRENCH WELLPOINTS



Owner: Public Service Electric and Gas Co., Newark, N. J.

Contractors: United Engineers & Constructors, Inc., Philadelphia, Pa.

Pumping Contractor: American Dewatering Corporation, Rockaway, N. J.

Adjacent to the Arthur Kill, deep excavation is made in the dry for the Discharge Canal Area, Unit #5, Sewaren Generating Station, Sewaren, N. J.

Moretrench Wellpoints, pumping from 2,000 to 4,000 gpm, are relieving the pressure exerted by 18' of water in the sand layer underlying the soft black clay.

Repeat orders make it crystal clear that you get results — at a saving — when you work with Moretrench — in the dry!

If you're estimating or excavating
a wet job, call us. We can help.

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Hackensack, N. J.
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New York Tel.: CO 7-2283

4900 S. Austin Ave.
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Tampa 9, Florida
TAMPA 61-1881

315 W. 25th St.
Houston 8, Texas
UNDERWOOD 4-7774

Rockaway
New Jersey
OAKWOOD 7-2100

WESTERN REPRESENTATIVE: Andrews Machinery of Washington, Inc., Seattle 4, Washington

CANADIAN REPRESENTATIVE: Geo. W. Crothers Limited, Toronto, Ontario

BRAZILIAN REPRESENTATIVE: Oscar Taves & Co., Ltd., Rio de Janeiro

Who else...

...but **HOUGH** provides these facts?

This factual data on PAYLOADER four-wheel-drive, rubber-tired tractor-shovels in each of 1, 2, 3, and 4 yard sizes points up the advantages of their design, performance and safety features. Comparisons include all competitive units from manufacturers' printed specs as of April 1, 1960.

1 cu. yd. H-30 PAYLOADER®



More Power: H-30 has 17% more horsepower than next most powerful machine in this category.

More Dumping Clearance and Reach: The H-30 has 4" more clearance and over a foot more reach.

Safety Boom Arms: All moving members pivoted in front of operator. **Exclusive** on the H-30.

Safety Ladder: Makes access to the operator's compartment easy and safe. Another **exclusive**.

"Full" Power-Shift Transmission: No manual shift, working to travel range. "PAYLOMATIC" transmission Hough designed and manufactured.

Four-Wheel-Brakes: **Exclusive** on the H-30 they permit equal stopping in both forward and reverse. Also sealed against dust and dirt.

"Operator's Choice" Brake Pedals: Dual pedals give the operator a choice of braking with or without transmission engaged. H-30 **exclusive**.

Closed Hydraulic System: Sealed and pressure-controlled hydraulic reservoir with renewable cartridge-type filter and fine-mesh screen. Another **exclusive** H-30 protective feature.

Separate Oil-Cooling Radiator: A fan-cooled "oil-to-air" heat exchanger cools transmission and torque-converter oil. Another **exclusive**.

Easy Accessibility: No other comparable unit has H-30 accessibility. Dip stick, filler cap, batteries, connections and service points reached from ground level.

2 cu. yd. H-70B PAYLOADER®



More Power: H-70 has more horsepower than the average of 9 competitive gas and diesel units.

More Dumping Clearance: The H-70 has 4" more clearance than average of 9 competitive units.

Safety Boom Arms: Underslung design keeps the operator safe from all moving members.

Safety Ladder: Makes access to the operator's compartment easy and safe. An H-70 **exclusive**.

"Full" Power-Shift Transmission: No manual shift from work to travel ranges. "PAYLOMATIC" transmission Hough designed and manufactured.

Four-Wheel-Brakes: Hydraulic, power-boosted four-wheel-brakes with separate parking brake. Front brakes sealed against dust and dirt.

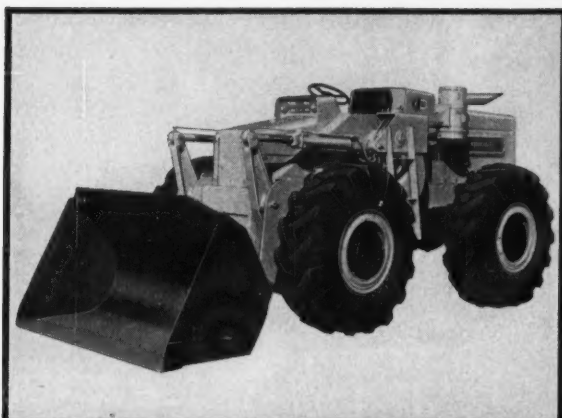
"Operator's Choice" Brake Pedals: Dual pedals give the operator a choice of braking with or without transmission engaged. A Hough "first".

Closed Hydraulic System: Sealed and pressure-controlled hydraulic reservoir with renewable cartridge-type oil filter and fine-mesh screen.

Separate Oil-Cooling Radiator: A fan-cooled "oil-to-air" heat exchanger cools transmission and torque-converter oil. An H-70 **exclusive**.

Torque-Proportioning Differentials: Transfer up to 24% more power to best traction wheels.

Easy Accessibility: Extra attention has been given to providing utmost accessibility to all service points.



3 cu. yd. H-90B PAYLOADER



4 1/2 cu. yd. H-120 PAYLOADER

More Power: H-90 has 24 more horsepower than the average of 8 competitive diesel models.

More Dumping Clearance: The H-90 has 10" more clearance than average of 8 competitive units.

Safety Boom Arms: Underslung design keeps the operator safe from all moving members.

Safety Ladder: Makes access to the operator's compartment easy and safe. An H-90 **exclusive**.

"Full" Power-Shift Transmission: No manual shift from work to travel ranges. Improved units have better operating characteristics.

Four-Wheel-Brakes: Power air brakes with big braking area on all four wheels assures easy, safe handling of the H-90 at all times.

"Operator's Choice" Brake Pedals: Dual pedals give the operator a choice of braking with or without transmission engaged. H-90 **exclusive**.

Closed Hydraulic System: Sealed and pressure-controlled hydraulic reservoir with renewable cartridge-type oil filter and fine-mesh screen. Another H-90 **exclusive** protective feature.

Separate Oil-Cooling Radiator: A fan-cooled "oil-to-air" heat exchanger cools transmission and torque-converter oil. An H-90 **exclusive**.

Torque-Proportioning Differentials: Transfers up to 24% more power to best traction wheels.

Easy Accessibility: Extra attention has been given to providing utmost accessibility to all points requiring checking and service.

Power-Steering: All "PAYLOADER" four-wheel-drive units have hydraulic power-steering.

More Power: H-120 has 38 more horsepower than next most powerful machine in this category.

More Dumping Clearance and Reach: H-120 has 4" more clearance, 6" more reach than next unit.

Safety Boom Arms: All moving members pivoted in front of operator. **Exclusive** on H-120.

Safety Ladder: Makes access to the operator's compartment easy and safe. Another **exclusive**.

"Full" Power-Shift Transmission: Hough-built, full-reversing, constant-mesh, countershaft-type with balanced rotating hydraulic clutches.

Four-Wheel-Brakes: Power air brakes with large braking area assure easy, safe handling at all times.

"Operator's Choice" Brake Pedals: Dual pedals give the operator a choice of braking with or without transmission engaged. H-120 **exclusive**.

Separate Oil-Cooling Radiator: A fan-cooled "oil-to-air" heat exchanger cools transmission and torque-converter oil. Another **exclusive**.

Better Balance: **Exclusive** use of lightweight, extra-strong "T-1" steel for box-section boom arms saves over a ton of "dead-weight" on the load-carrying end.

Better Stability: Counterweighted by approved use of dry ballast material in rear tires. Lower center of gravity, 50% of weight below rear axle. **Exclusive**.

Protection: Special dry-type air cleaner gives 99.8% dust removal efficiency under most adverse conditions. Sealed, pressure-controlled hydraulic system has cartridge oil filters and fine-mesh screens. **Exclusive**.

Extras: Canopy-type cab with windshield wipers and special lights is standard equipment.

HOUGH, PAYLOADER, PAYMOVER, PAYLOGGER, PAYLOMATIC and PAY are registered trademark names of The Frank G. Hough Co.

HOUGH®



THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS



SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY

THE FRANK G. HOUGH CO.

5-B-1

706 Sunnyside Ave., Libertyville, Ill.

Send data on all "PAYLOADER" models and attachments.

Name _____


Title _____

Company _____

Street _____

City _____

State _____



B.F. Goodrich

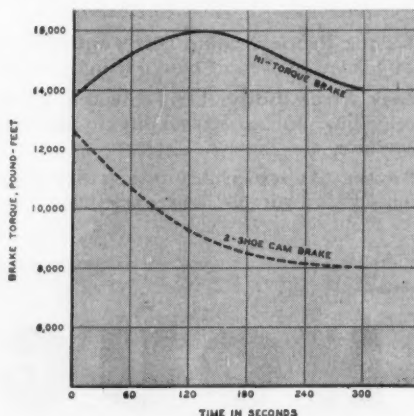
Full contact braking surface stops your vehicles twice as fast

Today's heavyweight vehicles need braking power to suit—and you get it with B.F. Goodrich Hi-Torque brakes. With these brakes, each of the shoes is forced by hydraulic power against the inside of the brake drum to provide *full-circle* braking action. Here are the advantages:

- Stopping distance cut approximately in half compared to conventional two-shoe brakes tested on identical vehicles and loads.
- Increased safety and controllability of the vehicle, permitting faster, more profitable use by the operator... shorter work cycles.
- Brake torque is maintained with minimum "fading" because of the non-energized design.

Hi-Torque brakes adjust themselves automatically, need no lubrication. Available in sizes from 17¼" x 4" to 26" x 7". For complete information ask your equipment manufacturer, or write B.F. Goodrich Aviation Products, a division of *The B.F. Goodrich Company, Dept. CM-5, Troy, Ohio.*

DOUBLE THE TORQUE—Dynamometer test made at constant speed 53 rpm, constant pressure conditions, brakes applied on 15-second cycles. Test duplicates operating conditions of heavy vehicle on long downgrade.



B.F. Goodrich Hi-Torque brakes

Construction Methods AND EQUIPMENT

MAY, 1960

VOLUME 42 • NUMBER 5

HENRY T. PEREZ, Editor

Advice for Survival

IF THERE IS any great complacency among contractors about the relatively high state of business activity, a study of the accompanying table of contractor failures should dispel it. Just released by Dun & Bradstreet, the first-quarter figures show numbers of failures up 17% over the first three months of last year. And their dollar liabilities jumped a whopping 58%.

Why did these companies go broke? It's not certain. But chances are most of the folded firms would still be in business today if they had only practiced the "Do's" and "Don'ts" listed below.

These 21 points were presented to the AGC's convention (page 105) by Robert L. Gordon, vice president and manager of the Bank of America National Trust & Savings Assn., Los Angeles. If more contractors would follow his advice, the record of contractor failures would not be so dismal.

DO'S

1. Be sure of your financing before you bid. Talk it over with your banker first.
2. Make a friend of your banker. He is your partner.
3. Be wise in your purchase of equipment.
4. Try to adjust overhead personnel costs to the present circumstances. The cart should not be allowed to pull the horse.
5. Employ the best accounting you can get. It may turn out to be your most profitable investment.
6. Keep your banker fully informed at all times.
7. Give your banker ample opportunity to understand your needs.
8. Be smart in the type of work you bid, and be sure you know what you are undertaking in all its implications.
9. Use diligence in collecting accounts receivable.
10. Exercise care in all things.

Contractor Failures—First Three Months, 1960

Reported by Dun & Bradstreet, Inc.

	Number		%	Liabilities ('000)		%
	1960	1959	Chg.	1960	1959	Chg.
U.S. Total	629	537	+ 17	\$42,190	\$26,774	+ 58
BY TYPE OF CONTRACTOR						
General building contractors	242	176	+ 38	21,842	12,399	+ 76
Building sub-contractors	348	310	+ 12	17,531	11,239	+ 56
Other contractors	39	51	- 24	2,817	3,136	- 10
BY SIZE OF LIABILITY						
Under \$25,000	291	274	+ 6	3,091	2,894	+ 7
\$25,000-\$99,000	228	212	+ 8	10,932	9,601	+ 14
\$100,000 & over	110	51	+116	28,167	14,279	+ 97
BY REGION*						
New England	37	36	+ 3	3,600	1,285	+180
Middle Atlantic	142	128	+ 11	7,857	8,130	- 3
South	90	86	+ 5	6,181	3,130	+ 97
Middle West	145	111	+ 31	8,937	4,752	+ 88
Miss. R. to Rockies	72	49	+ 47	5,556	2,878	+ 93
Far West	143	127	+ 13	10,059	6,599	+ 52

*Regions approximated by combining Federal Reserve Districts of original data.

DON'TS

1. Be careless.
2. Take on more work than you can handle and finance.
3. Take a job and then try to arrange financing for it.
4. Be equipment happy.
5. Let yourself become married to a burdensome overhead unless you can support it.
6. Employ breast-pocket accounting.
7. Keep your banker in the dark.
8. Try to rush your banker into a decision on a loan application.
9. Take on work unfamiliar to you without having the close co-operation of someone who knows what he is doing.
10. Hesitate to ask for the payment of monies owing to you on the date it is due.
11. Depend entirely on additions and change-orders for your profit on any given job.

"Our drill-driver is a completely self-contained unit that can do a complete job under any of the hazardous conditions that may be encountered in taking large diameter shells through overburden, seating them into bedrock, drilling the necessary sockets, and setting the core beams."

William H. Geer, General Superintendent,
Western Foundation Corp.



DRILL-DRIVER—Converted by contractor to handle an 8,500-lb drop hammer as well as a 6,500-lb drill bit, Bucyrus-Erie 42-T churn drill sits on bed frame carrying 45-ft leads.

Drill-Drivers and TV Keep Caisson Job Rolling

BOSTON'S TALLEST BUILDING, the 750-ft-high Prudential Tower, calls for some of the Hub's deepest and toughest foundations—30-in.-dia steel caissons 130 ft long containing H-beam cores averaging 500 lb per ft. The cores are socketed up to 23 ft in underlying bedrock. To keep the job rolling, the contractor re-jiggered churn drills to drive caissons as well as to cut sockets, which are inspected by an underwater television camera.

George A. Fuller Co. is building the 52-story structure in the city's Back Bay area where ground is fill material over silt and clay above shaley limestone bedrock. Ground water level is high.

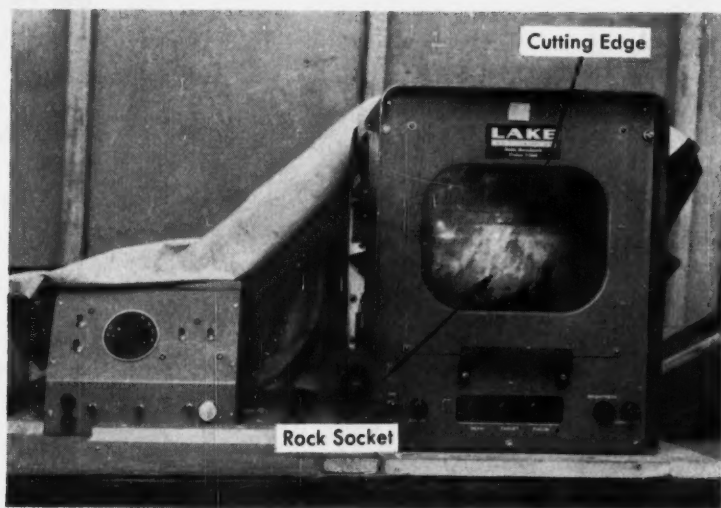
Cofferdam Seals Site

Because many of the nearby buildings rest on wood piles, city officials did not want any lowering of the water level for any appreciable time. This meant that

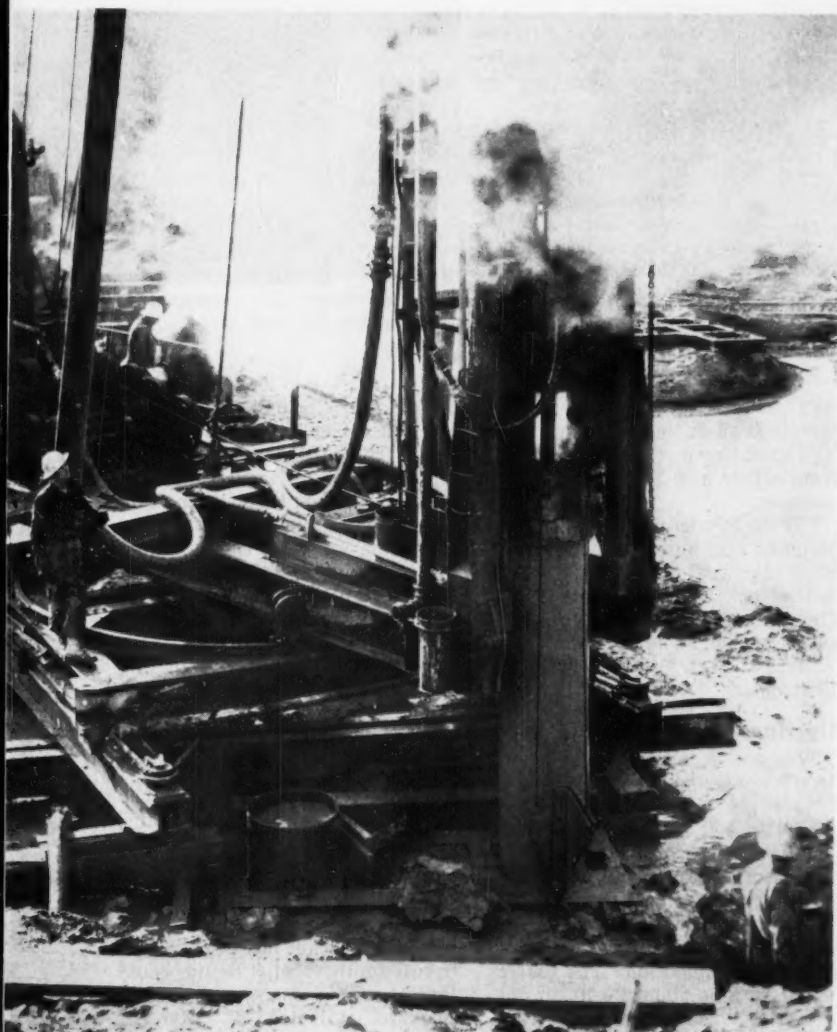
before excavation could begin, the construction site would have to be sealed off from the surrounding area.

To obtain such isolation, Boston Subcontractor Roy B. Rendle & Co. drove a double-wall steel cofferdam of Bethlehem Z sheet piling around the entire site. An elaborate wellpoint feedback system also was installed as further insurance against any lowering of the ground water level outside.

While the excavation work



TELEVISION—Watertight camera, 130 ft down in water-filled caisson, transmits picture to viewing screen in job-site trailer.



REGULAR PILE DRIVER—Turntable skid rig drives 30-in. caisson shell 130 ft long. New York City's Western Foundation Corp. is putting in 144 of them for Geo. A. Fuller Co.

went ahead, another subcontractor—Western Foundation Corp., of New York City—moved special equipment onto the job to drive 144 drilled-in caissons for the building's foundations.

The caissons, averaging 130 ft in length, are being installed in clusters of two to four caissons each. Clusters will be topped with an 8½-ft-thick reinforced concrete cap.

Each caisson is a 30-in. Bethlehem steel pipe with ½-in. wall. This is driven through overburden to bedrock. After muck is cleaned from the pipe, a socket of the same diameter is drilled 15 to 23 ft into the rock beneath it.

A steel H-beam core, also furnished by Bethlehem, next is inserted to extend from bottom of socket to caisson cut-off elevation. A 4,000-psi tremied grout bonds the core to the rock. Then the caisson shell is filled with 4,000-lb concrete.

Welds Splice Shells

Bethlehem delivers the pipe shells in 65-ft lengths, two of which make up a 130-ft caisson. At the site, Western welds a cutting shoe on the bottom and a splicing sleeve on the top of the first length to be driven.

The cutting shoe is alloy steel, about 15 in. high and 1 in. thick. It incorporates an inner circumferential seat on which the shell sits. The splicing sleeve is a 12-in.-high external collar.

A turntable skid rig carrying 100-ft leads and a 75-hp boiler drives the caisson shell sections with a Vulcan O hammer.

When it has driven a group of 65-ft first sections, the rig goes back to set second sections in their splicing sleeves. A couple of taps with the hammer insure solid seating, then the joint is tack welded. After a group has been set and tacked, the rig moves on to drive other caissons while the splices are welded solid. It returns later to finish driving when splices are completed.

Jet Cleans Caissons

Periodically, as driving resistance builds up excessively, silt and clay are removed from the shell by a water jet handled by the pile driver.

This is done by carefully working a 6-in.-dia jet pipe, nozzleed to 1½ in., down along the inside of the shell wall. As little water as possible is used during this op-

Caissons Require Many Operations



WELDING—Cutting edge (above) is welded to top of first section of a caisson, and a splicing sleeve (below) is fitted to the other end of the 65-ft length of shell.



DRIVING—A 75-hp boiler on the skid rig furnishes steam to a Vulcan O hammer to drive the caisson shells. On foundation job for 750-ft-high Prudential Tower in Boston, the machine drives and cleans one shell per shift.



CLEANING—Huge slug of clay, pushed up out of caisson shell by water pressure from a jet inserted below it, is kicked to the side by man standing in driver's leads.

DRILL DRIVERS AND TV KEEP CAISSON JOB ROLLING... continued

eration. When the tip of the 120-ft jet pipe is 25 to 30 ft below the level of soil in the caisson, water is turned off. Next a couple of shovels full of sand are tossed in to clog the hole around the jet pipe.

Then water pressure is turned on full. This forces a long solid plug of material out of the caisson, much like a hydraulic ram. For this operation, two four-stage Gould pumps in tandem furnish 400-psi water.

When the bottom of the 130-ft caisson shell nears bedrock, one of Western's special drill-drivers takes over from the skid rig.

Contractor Alters Rig

This machine is basically a Bucyrus-Erie 42-T churn drill. But Western modified it by changing the friction drive to a positive clutch drive and altering main clutches and gearing for increased power. They also added three hydraulic jacks for leveling.

Major change was to remove the 42-T's derrick mast and in-

stall the machine on a bed frame carrying 45-ft leads. Now the rig's spudding mechanism can operate either a drill bit or a drop hammer.

For the Prudential job, Western designed and built a special five-wing star drill to cut the socket in the rock for the caisson core. The bit stands about 8 ft high, weighs 6,500 lb, and is about 29 in. across. It drills a socket 15 to 23 ft deep.

Rig Handles Hammer

Western also uses an 8,500-lb drop hammer on the modified 42-T to drive the caisson's cutting edge 1 to 4 ft into the rock. The rig's maximum 4-ft stroke gives the hammer up to 34,000 ft lb of energy per blow.

The drill-driver also handles a suction type bailer to clean cuttings from the socket. The bailer is a steel pipe about 20 in. in dia and 15 ft long. Its bottom is fitted with a flap valve. Inside is a piston attached to a lifting cable.

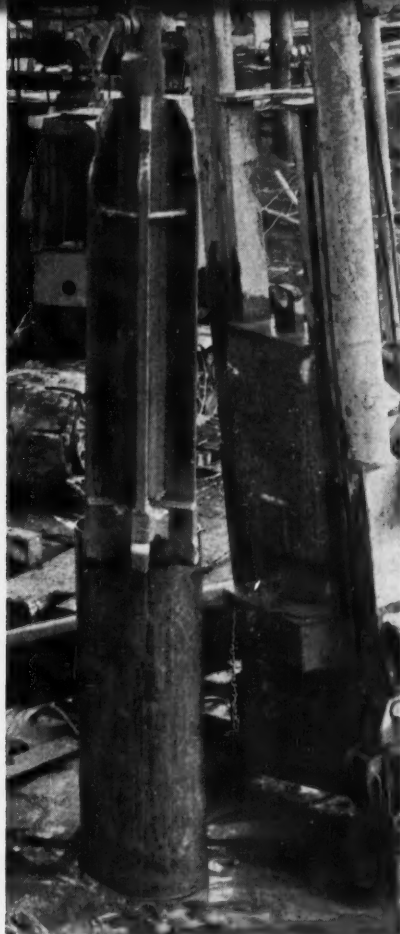
With the bailer seated at the

bottom of the drilled hole, the machine takes up on the lifting cable. This pulls the piston to the top of the bailer, causing an inrush of cuttings through the flap valve. Continued hoisting lifts the bailer out of the caisson. Then the bailer is tipped on its side, and cuttings flow out through a hole in the wall near the top, below the raised piston.

Western's drilling and bailing technique makes for an extra-strong socket. That's because the churning action washes out fines that might be deposited in seams or crevices in the rock wall. Also, the five-pointed star drill cuts a rough wall that gives good bond with the grout later poured to hold the steel core.

TV Inspects Rock

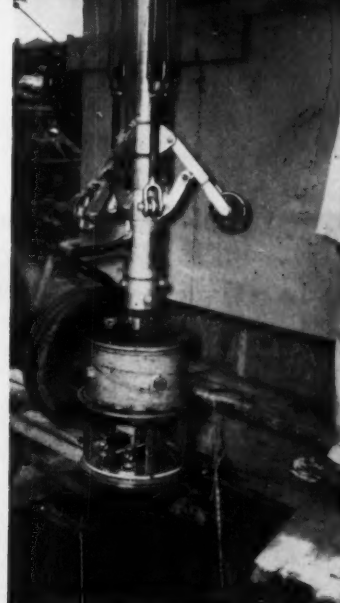
When a socket has been drilled to full depth, it must be inspected to make sure the rock is sound. Because a full head of water has to be maintained in the pipe to prevent seepage of outside material into the caisson, Western re-



DRILLING—Special five-wing star drill rests on caisson. Note drop hammer at right.



BAILING—Suction type bailer removes cuttings from socket drilled 23 ft in rock.



INSPECTING—Special RCA TV camera is inserted in shell to check rock socket.

sorts to a brand new inspection technique — underwater television.

First a Flygt electric submersible pump removes all fines from the socket to clean up the water for clear viewing. Then an RCA watertight television camera is lowered into the hole. Through a closed circuit, its picture is transmitted to a viewing screen in a trailer at ground level.

Splices Hold Cores

When a caisson has passed inspection, its steel H-beam core is inserted. Cores average about 500 lb per ft and, like the caisson shells, are delivered to the job in two pieces that must be spliced together.

First a pair of short lengths of 18-in. channel are bolted around a core section near its top. This clamp not only acts as a safe handling hook but also suspends the first core section from the caisson rim while the second is spliced on. Because the core sections have milled ends and will be sole-

ly in compression, the core itself need not be welded. Instead, sections are joined by two 12x48x 3/4-in. splice plates welded to the flanges.

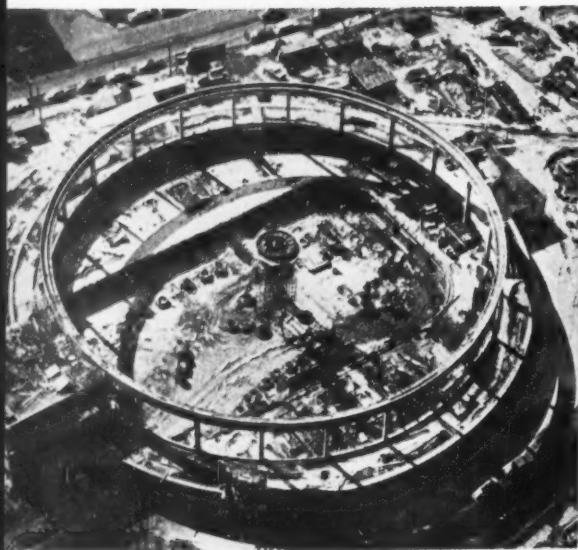
When the splice is completed, the suspension clamp is removed and the core seated in the rock socket. Then 4,000-psi grout is tremied in to hold the core and seal the caisson. A few days later, after the grout has set up, the caisson is dewatered and filled with 4,000-lb concrete.

Dry-Pack Fills Caisson

Top of concrete is held 3 to 4 in. below top of caisson shell. And the shell itself is cut off slightly below top of core. After caisson concrete has set, the space above it is filled with dry-pack concrete. Then a steel cover plate, 4 1/2 to 8 in. thick and 36 to 44 in. square, is seated solidly on the core, squeezing out any excess dry-pack. Finally, caisson shell and cover plate are welded together to complete the drilled-in caisson.



CORE SETTING—Heavy steel H-beam weighing an average 500 lb per ft extends from bottom of socket to caisson cut-off elevation. Here, two lengths are welded.



A 240-ft dia circular auditorium in Utica, N. Y., will provide an unobstructed view for 6,500 spectators. But putting up the clear-span roof was a demanding construction job. It called for building a complex concrete compression ring around the outside of the building (above) and stringing a double layer of steel cables that support the roof (right).



Complex Concrete Ring Supports

ERECTING a "bicycle wheel" in the sky was part of the assignment that Sovereign Construction Co., Ltd., of Fort Lee, N. J., took on when they won the contract to build a \$4-million Memorial Auditorium in Utica, N. Y.

The bicycle wheel actually is the roof of the structure. It's a brand new concept in roof design. The frame looks exactly like a 240-ft dia bicycle wheel but probably is more accurately described as a suspended, prestressed, dual-cable circular system.

The hub of the wheel consists of two steel rings, held about 20 ft apart vertically by spreaders.

From each of these rings a layer of 72 cables extends outward like the spokes of a wheel. Both layers are connected at their outer ends to a circular concrete ring that corresponds to the rim of the wheel. The cables are prestressed. This keeps the inner steel ring in constant tension and the outer concrete ring in constant compression.

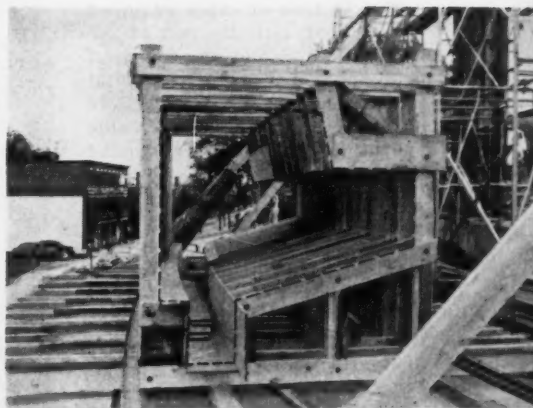
Building the roof required the combined ideas and skills of two experienced contractors. John A. Roebbing's Sons Corp. fabricated and installed the steel rings and cables. Sovereign, as part of their general contract, built the outer

compression ring to exacting dimensions and tolerances.

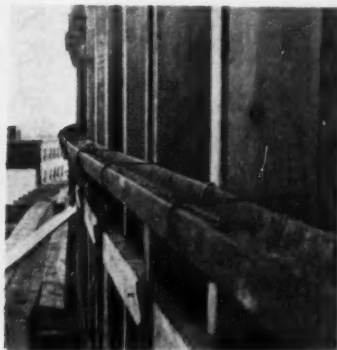
Unique Design

The architects for the auditorium, Gehron & Seltzer of New York City, wanted a circular building with a seating capacity of 6,500 and no interior columns. They asked Lev Zetlin, a New York consulting engineer, to develop a cable system that would do the job. The result is a new concept that could make possible efficient roof spans of 1,800 ft.

A steel cable system exceeds all other systems in structural efficiency for medium and long range



RING FORMS—Bolted wood yokes every 2 ft hold plywood forms to shape the ring.



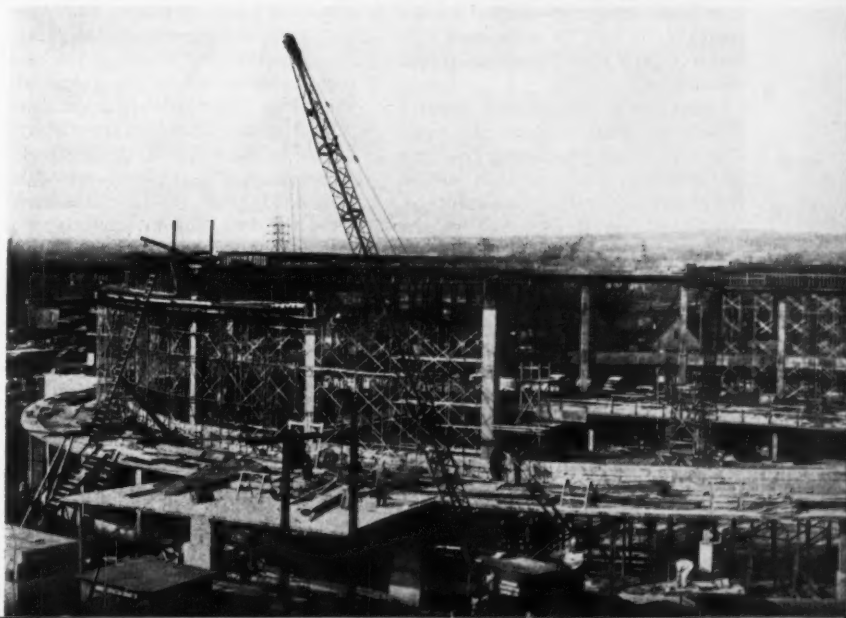
FORM SUPPORT—Yokes are held in line by curved steel walers in front and behind.

POURING THE RING—Crane lifts concrete bucket to ring forms. Ring is poured in alternate 60-ft sections. Heavy steel shoring carries the forms and yoke bracing.

Cable Roof

spans. But a cable system has no rigidity and is susceptible to flutter. Up to now, this has been overcome by holding down the cables with guy wires or heavy roof loads.

The new system is self-dampening. Dr. Zetlin used two sets of cables and stretched them apart to pretension them. The 2-in. upper cables have a smaller stress than the 1½-in. lower cables and therefore always have a different natural frequency. No matter what sort of motion is introduced into the system by dynamic forces such as wind, one set of cables will be out of phase



COMPLEX RING SUPPORTS

continued

with the other and they will dampen each other.

The 72 tons of cable required for the roof, plus the rest of the roof structure, add up to a dead load of 14 psf. A conventional roof structure weighs about 40 psf. The lightness of the cable roof allowed the designer to make the columns smaller.

Compression Ring

The toughest part of the job for Sovereign was the concrete compression ring. The ring is 240 ft dia and had to be cast with extreme accuracy because the radius of the ring was an important factor in tensioning the steel cables (the tension was pre-calculated on the basis of the cable lengths).

The ring is supported on 24 square columns spaced 15 deg apart. Sleeves for the 72 pairs of upper and lower cables were cast into the ring every 5 deg.

To prepare for the roof installation, Sovereign first poured the concrete floor slab and roof of a one-story perimeter structure around the auditorium's arena. Then they formed and poured the columns for the compression ring for the arena roof.

The columns were 12x12 in. square and 30 ft high. Sovereign built plywood forms to the full height of each column but poured a column from two levels. Through a window half way up the form they poured the bottom half. Then they blocked the window and continued the pour to the top of the column.

The compression ring itself was difficult to form and pour. In addition to being circular, it has a complex, irregular-shaped cross-section. It is 5 ft wide and 6 ft high in its longest cross-sectional dimensions.

Sovereign considered several alternate ways to pour the ring. They rejected precasting the ring in sections. Each section would have to span at least two columns. But the ring is designed so the center of gravity of the cross-section lies inside the columns. So a section of the ring sitting on two columns would fall into the arena unless it was extensively braced.

After considering several poured-in-place techniques, they decided to pour the ring in 60-ft lengths. To carry the formwork they erected steel scaffolding designed to carry a load of 6,500 lb



STEEL RINGS—Pair of cranes erect two steel tension rings in center of building on steel scaffold tower. Top of tower is midway between the final position of the rings.

per lin ft. They shaped the girder cross-section with plywood sheets braced with bolted wood yokes spaced 2 ft on centers.

The yokes were built in a jig on the ground and put into place one at a time by crane. The exterior of the yoke was rectangular in shape for easy bracing; the interior conformed to the shape of the ring. The top section of the yoke could be unbolted separately after the pour for easy removal. Sovereign assembled enough yokes for two 60-ft pours and used the two sets alternately.

A survey crew checked the position of the yokes and adjusted them with guy cables and turn-buckles. Curved 4-in. channel walers in front and back kept the yokes in line.

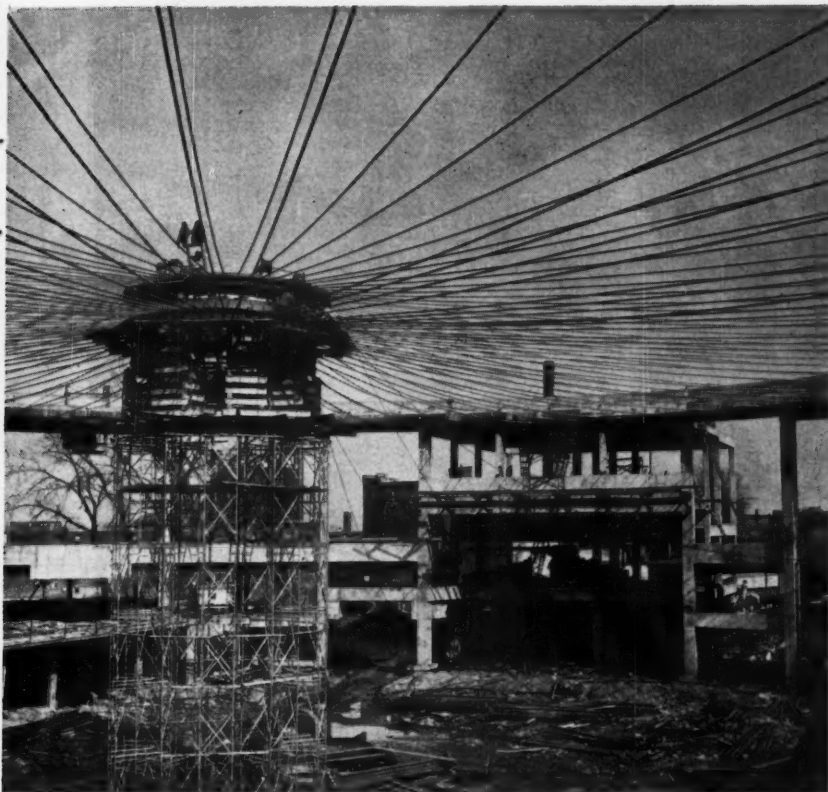
One of the problems during the pour was to fill all sections of the form and prevent voids beneath a horizontal panel that formed the top of a lip on the ring. The con-

crete was designed for 5,000 psi ultimate strength and was relatively stiff. Sovereign added Plastiment to increase the workability. In addition, they drilled 2-in. holes at frequent intervals along the top of the lip form to release air and allow a man to check for voids. During the pour, men with vibrators worked right inside the forms to distribute the concrete to all corners.

Every 5 deg Sovereign set in sleeves to hold the cables. The fabricator originally figured on one 8-in. sleeve for the top cable and a similar but separate sleeve for the lower cable. Sovereign asked to have the two sleeves welded together during assembly to make it easier to maintain the proper angle between them during the pour. Each pair of sleeves weighed 900 lb. The crew positioned them with a block and fall inside the form.

Sovereign engineers with sur-

New Technique Prestresses Cables



THREADING CABLES—Crews thread 72 cables from each steel ring to sockets in compression ring. Each cable was tailored to fit surveyed radius between the rings.



TENSIONING—After main prestressing, rolling scaffold makes final adjustment.

vey equipment kept an unusually close check on the location and elevation of the sleeves during the pour. Their care paid off; after the ring was complete, none of the 72 diameters varied more than $\frac{3}{8}$ in. in 240 ft.

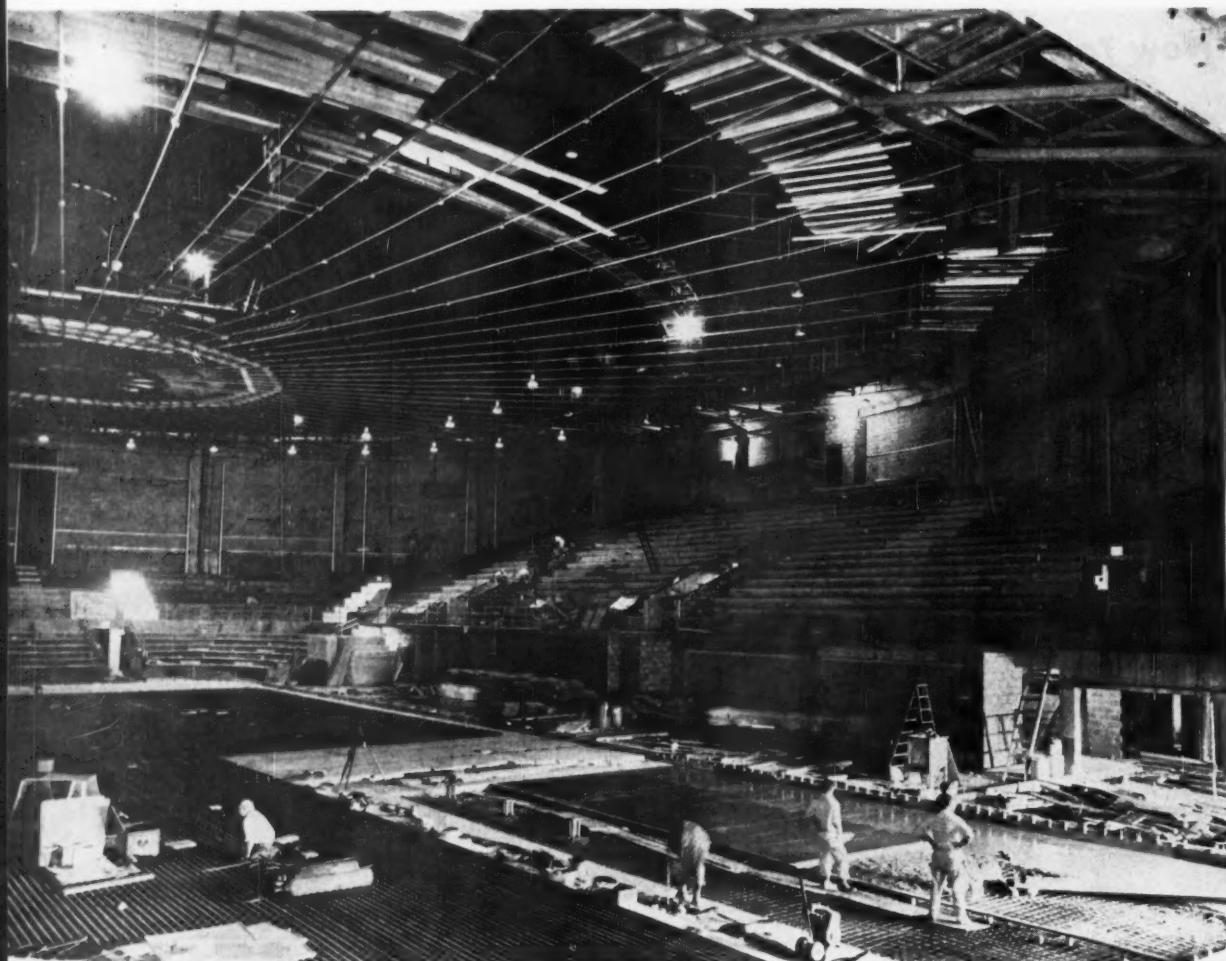
Sovereign realized that the schedule of the whole job depended on getting the ring poured. Until it was finished, nothing else could be done to the roof. So they pressed the work during the autumn and completed the ring by working overtime on the day before Thanksgiving. The next day, a heavy snow storm ushered in an unusually severe winter. Had the ring not been completed when it was, the construction schedule might have been delayed all winter.

Steel Rings

Sovereign set the two steel tension rings on a steel scaffold in the center of the arena. The top of



SPREAD RINGS—Main prestressing occurs when center scaffold is removed, steel rings are jacked apart about 20 ft, and permanent vertical struts are inserted between cables.



POURING THE FLOOR—Crews pour bottom slab for floor of hockey rink. Other men install the 8 in. of steel pipe that will carry

brine for ice making equipment. On top of the pipes, the final slab will be poured in one continuous 28-hr concreting operation.

the scaffold was approximately midway between the final position of the two rings. When the outer concrete ring was complete, Roebling laced the cables between it and the steel rings. Tensioning the cables was the trickiest part of the whole operation. Sovereign and Roebling worked closely together on this phase, developing special equipment for the job.

They made an accurate survey of the location of all cable connections in the compression ring. Then Roebling pre-stretched and measured the cables under theoretical dead loads at their plant. This reduced final adjustments of the end connections at the site to a minimum.

When the strands were in place they were set to approximately their final adjustment at the outer ring. Then the scaffolding under

the steel rings was removed and the rings hung free.

A series of jacks between the tension rings spread them apart 20 ft vertically and thereby produced most of the prestress in the cables. The jacking was done in a carefully controlled sequence to prevent uneven stress on the outer ring. The whole prestressing system, in fact, was designed to exert the prestress forces evenly around the concrete ring to prevent its distortion.

When the steel rings were 20 ft apart, permanent vertical struts were installed between the cables to increase the tension to the final specified figure.

Final adjustment of the tension in each line of cables was made at the fittings at the compression ring by a specially designed rolling scaffold that could move

easily around the outside of the ring to any of the 72 connections.

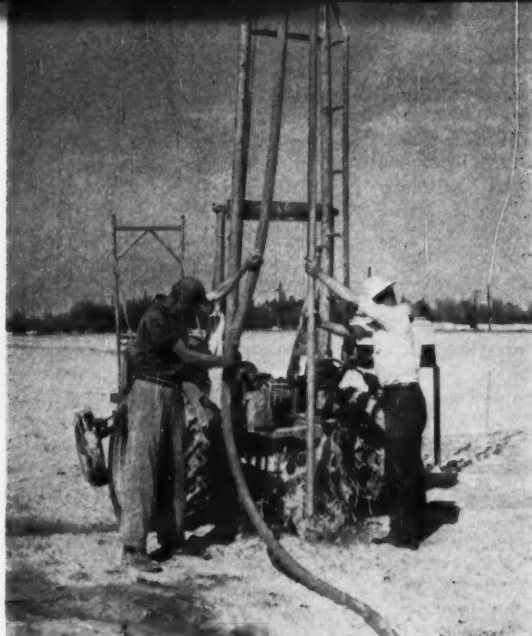
Other Installations

Above the cables is a corrugated steel decking topped by insulating boards. The outer roof surface is felt impregnated with asphalt and covered with gravel.

For the arena floor, a concrete sub-floor first was poured and waterproofed with membrane. A 4-in. rigid insulation board was placed over this slab. On top of this went 8 in. of steel-pipe brine coils that will make ice when the arena is used as a rink.

The top slab for the rink was poured in a single 28-hr continuous pour. The entire building required 7,000 cu yd of concrete.

For Sovereign, Paul Peckar was project manager and Stewart Shuler was superintendent.



JETTING—A 2-in.-dia pipe casing is jettied 20 ft into sugar sand as first step in consolidation of house site in Florida by blasting.



LOADING—Ten or eleven sticks of 60% dynamite are inserted in casing, which then is withdrawn. The holes next are fired singly.

Blasting Compacts Sand Fill

DYNAMITE plays an unusual role in a new scheme to turn sandy wasteland into choice homesites. A Florida developer shoots unstable soil, not to pull it apart but to compact it to meet rigid FHA specs. The method puts the land to use in weeks instead of months and saves hundreds of dollars on each house foundation.

The idea also saved the day for Scott Kelly Associates, developers of the 40-acre Cleveland Heights Manor project in Lakeland. Faced with an FHA turn-down because of low soil bearing values at the site, Kelly welcomed any practical idea for building on the sugar-sand fill. Several schemes were tried, including a raft-type foundation slab, dewatering the soil, and various ordinary compaction methods. Only controlled blasting fills the bill:

- In one "pass" the powder gang produces required compaction in deep layers of the cohesionless soil.

- Cost of compaction comes to only pennies a cu yd.

Site of the novel blasting operation is an area of mined-out phosphate pits just south of Lakeland. Builders had long eyed the barren acreage as ideal for a large-scale housing project. Close

to the city, the site also faced a line of sparkling lakes—the flooded remains of abandoned strip pits.

However, subsurface conditions stopped cold any plans to develop the land at reasonable cost. The soil profile tells why, but not as well as old-timers who recall the area in its heyday.

What had happened was this: Up to a decade ago, active phosphate mines dotted this territory. Giant draglines stripped the overburden, then pulled out the 20 to 25-ft-thick phosphate lode. When the deposits petered out, the digging crews moved on. In their wake they left deep open trenches that soon filled with water.

Some of these pits, however, had been put to use as disposal basins for waste from the phosphate processing plants. The tailings—mostly fine sand from 0.15 to 0.4 mm in grain size, with some clay lenses—refilled the pits right up to the brim. On this land Kelly proposed to build houses.

Buried Quicksand

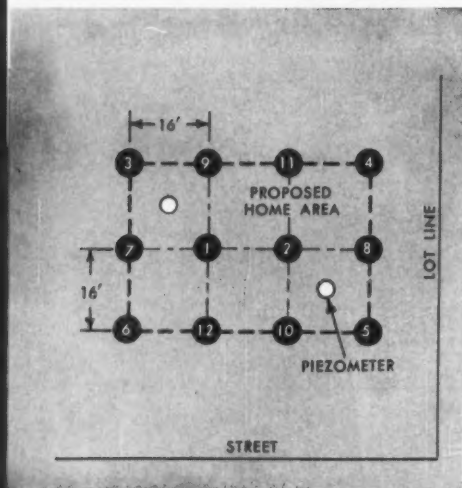
On the surface there was no problem. The ground was firm enough to take the weight of a truck. Action of rainfall had produced medium density in the top 5 ft or so of the fill.



FLOWING—The blast re-orientates and compacts sand grains, which displaces water and causes it to gush from piezometer.

Beneath the crust, however, remained a 10 to 20-ft-thick layer of very loose soil—a hidden quicksand pool. Test borings showed almost no bearing strength in this layer.

How long the fill would support a house before serious settlement developed was anybody's guess. FHA officials refused to take the risk. They vetoed financing of



PATTERN—Blasts are set off on 16-ft centers in numbered sequence around house.

BLASTING SAND FILL... continued

homes built on the unstable soil.

Kelly called in Soil Compactors, Inc., from nearby Tampa, to study the problem and recommend a practical way out. The specialists ran a series of field tests to check the value of deep blasting—a method suggested by almost-forgotten highway-fill experiments in the Midwest.

Armed with good reports on the trial runs at the Lakeland property, Kelly decided to go ahead with full-scale shooting. Soil Compactors won the contract to handle all field work.

Powder Placement

A four-man field crew places the shots. Size and location of each charge has already been fixed by soil studies and a check of the results of the trial runs. The idea is to get good overlap of influence from adjacent shots while limiting compaction to the area directly beneath the proposed house slab.

First the men stake out the shot hole pattern. The grid consists of 12 holes (three rows of four holes) spaced on 16-ft centers in both directions. The men place the charges with a job-built jetting rig—a 35-ft-high steel-pipe mast—that is tail-mounted on a rubber-tired utility tractor.

Jetting action of water from a Jaeger 2-in. centrifugal pump sinks the casing pipe to full 20-ft depth in just 30 sec. The 2-in. pipe penetrates the sand under its

own weight. The men lean on the casing when necessary to push it through denser clay lenses. The holes are wet. That's because the water table stands about 3 ft below ground.

When the jet pipe reaches full depth, the powder boss unscrews the top plug and drops in a stick of Hercules Gelamite 60% dynamite. An EB cap with 30-ft leads is already inserted in this first stick.

Each of the perimeter holes is loaded with a total of ten sticks; the two center holes take 11-stick charges. Depth of the hole (20 ft) locates the charge at about the center of the sand layer to be compacted. No spacers are used. After loading, the casing is pulled by a line from a power take-off winch on the tractor, and the hole is stemmed with dirt to ground level.

Pore Pressure Control

Careful timing of shots is the key to compaction success.

Here's why: Vibration and impact of the underground blasts cause the sand grains to re-orient; to settle closer together. This action displaces a large volume of water. Unless the water finds a ready escape path, pore pressure builds up in the soil. Too much pore pressure and the entire mass begins to "flow"—just the opposite of the desired effect.

Tests of the soil gave this warning: If pore pressure builds up a hydrostatic head of 3 ft above ground level (the same distance the water table is below ground) then the sand might liquefy. Time interval between shots must be long enough to allow trapped water to drain off.

How can the men be sure the pore pressure is at a safe level? Screen-tipped pipes, jetted 20 ft into the soil give the answer. The pipes, or piezometers, also act as safety valves to drain the displaced water from the soil. The drill crew sinks two piezometers in each house lot. Tops of the pipes are set exactly 3 ft above ground surface.

After each shot the men check the top of the pipes. As soon as water flow stops, it's safe to fire the next hole. An improvement on this idea has already been suggested. The field gang feels the piezometers should be made of transparent plastic. That way it would be easy to watch the rise and fall of the water level even when it wasn't high enough to overflow the pipe.

Shooting

Stationed behind a switch-studded control board (designed and built by the contractor) the crew chief masterminds the blasting cycle.

Wire leads connect each charge with a numbered post in a row of terminals across the top of the board. By flipping a switch, the operator can check all connections on a built-in galvanometer: good insurance against misfires.

When everything's checked out, the man behind the board clicks the No. 1 switch to "on" position, turns a safety switch to No. 1, and finally triggers the main switch. Only sign that the charge has gone off is a slight thud underfoot.

A split second later water gushes out of the piezometer nearest the No. 1 hole. After a noticeable time lag, the piezometer on the other side of the lot starts to flow. Water pours from the pipes for about 1 min. When all flow has stopped, the operator detonates the second hole.

Settlement of the ground can be plainly seen after the first four or five holes are shot. The surface sinks, forming a saucer-shaped depression that is about 2 ft deep at the center of the lot. Decrease of flow from the piezometers shows that most settlement takes place after the first few shots.

Results

What degree of compaction is achieved? Very high, according to before-and-after soil bearing tests. The underground sand layer scaled at 25% relative density before work began. After blasting, the same soil shows 96% density—well above FHA requirements.

Costs run about 7¢ a cubic yd for the material compacted (about \$50 a lot). By contrast, a heavily reinforced raft-type foundation, test-checked on another lot, would run up the cost of each house almost \$500 over a standard slab.

Credit for much of the basic research on Kelly's project, and for the ground rules by which the job is run, goes to Byron J. Prugh, who holds the post of director-consultant with Soil Compactors, Inc. H. J. McGillivray, manager of the Tampa office of Pittsburgh Testing Labs, collaborated in the initial work and was in charge of all soil tests. A. L. Brazeal, a Soil Compactors' vice president, supervised field work.



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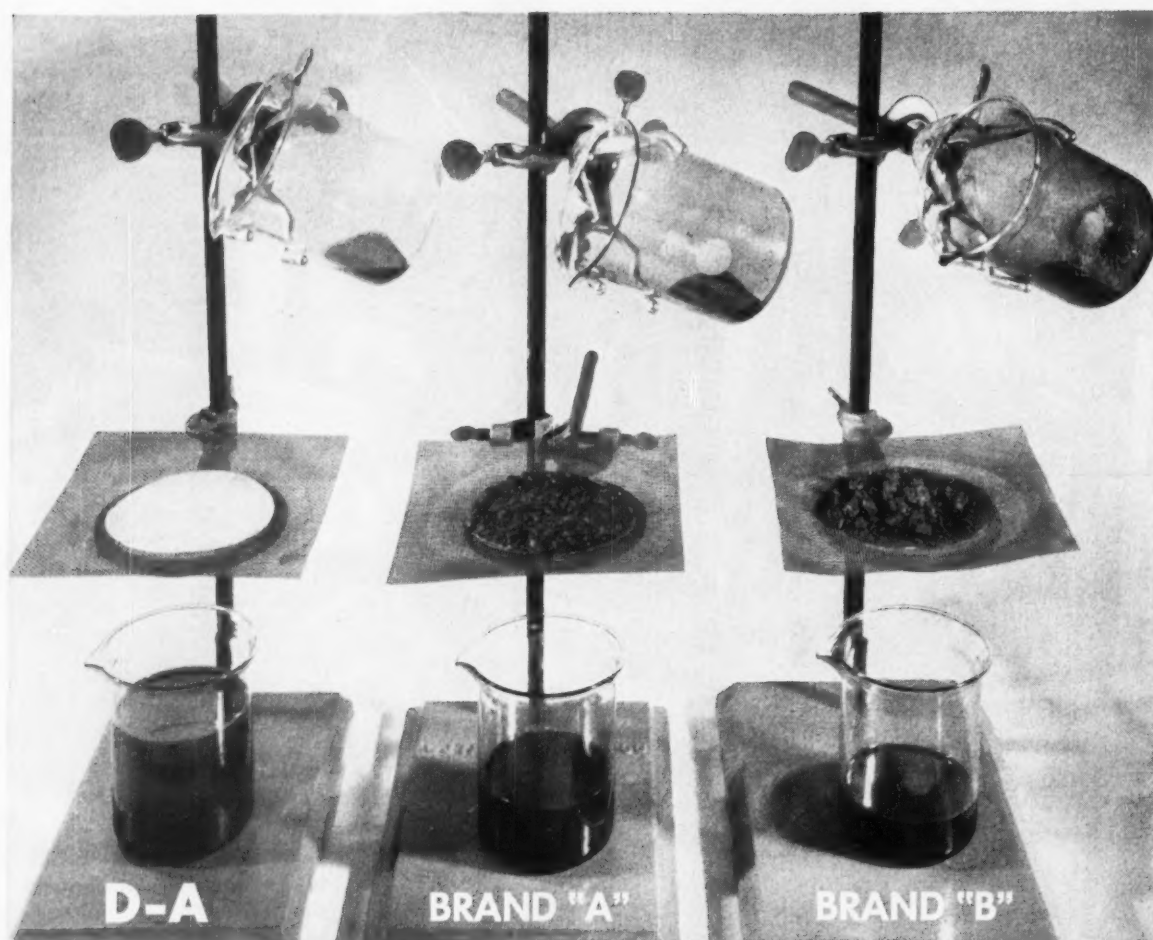
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Bid-Shopping Control Plan Highlights AGC Convention

By L. L. WISE
Associate Editor

A PLAN aimed at voluntary control of bid-shopping and bid-peddling highlighted sessions of the 41st annual convention of the Associated General Contractors of America in San Francisco late in March. The plan (box) was recommended by a joint committee of AGC and mechanical contractor groups. Here are the actions on the controversial measure:

SUNDAY—Tabled by the AGC governing and advisory board.

MONDAY—Adopted after a prolonged floor debate by AGC's Building Division.

THURSDAY—Referred to local chapters for "appropriate" local action by resolution of the convention.

Result of the action is that, for the time being, any AGC effort to control the evils of bid-shopping and bid-peddling will be conducted on a local level only and not on a national basis. The plan also has important implications on furthering of the single contract concept with substantial support by mechanical contractor groups. National effort to further

this now becomes quite difficult.

The plan was developed by the Council of Mechanical Specialty Contracting Industries and AGC. Draft of the plan had been reviewed by AGC committees, including the executive committee, as well as by CMSCI. Finally, in January, a compromise plan representing much give and take was adopted by the CMSCI-AGC cooperative committee. In that same month the AGC executive committee authorized submission of the plan to the AGC governing and advisory board at the San Francisco convention.

The governing and advisory board did not treat the plan kindly. Official action was to table it. Many of the board's members expressed a sincere belief that improvement in relations between contractors and subcontractors was desirable, and a motion was passed to this effect. But in explaining the board action to the membership at the opening general session of the convention, AGC President James W. Cawdrey said that there had not been enough time for the group to study the proposal thoroughly.

continued on next page

CMSCI-AGC Subbid Plan

I. Purpose of the Plan

The intent and purpose of this plan is to create an effective and voluntary system of receiving and handling subbids to eliminate misunderstandings and abuses sometimes associated with these procedures. The success of this plan is dependent on the willingness and honesty of those who cooperate and in no way should it be construed or used as a means of promoting unethical or unlawful practices.

Certain unethical and unfair trade practices seriously impair the effective operation of the contract method in the public interest and must be accorded the strongest public condemnation. Among such unethical and unfair trade practices are bid shopping by prime contractors and bid peddling by subcontractors. It is the responsibility of those in the industry to curb and eradicate such practices to the greatest extent possible.

The Council of Mechanical Specialty Contracting Industries-AGC National Joint Cooperative Committee firmly believes that the industry, as represented by its recognized associations, is capable of honestly recognizing these problem areas and effectively initiating remedial actions within the industry. Most of the practices considered unfair within the industry are fundamentally affected by the moral conduct of the individuals associated with the work.

To this end the joint committee does hereby strongly recommend the adoption by the industry and customers of construction services, of certain bidding procedures designed to curtail these improper activities, and calls upon both buyer and seller of these services to adhere to them in the public interest.

II. Implementing the Plan

Industry cooperation is necessary on both local and national levels and toward that end the following procedures are recommended:

- (1) Recommend to the national American Institute of Architects that they review this plan and recommend its adoption by local AIA chapters.
- (2) Recommend the forming of local joint cooperative committees representing the responsible general and specialty contractors patterned after the CMSCI-AGC National Joint Cooperative Committee. These committees would review and adopt such



PRESIDENTS—Outgoing AGC president James W. Cawdrey of Seattle (left) greets his 1960 successor, John A. Volpe, head of John A. Volpe Construction Co. of Malden Mass.

SUBBID PLAN . . . continued

parts of the plan that they agree would help to eliminate the abuses and unfair trade practices that are evident in their area.

(3) Recommend to the local AIA chapters that there be incorporated in the instructions to bidders and the bid forms, requirements and spaces wherein the specialty contractors being considered for the work are to be listed on all building construction contracts.

III. Details of the Plan

SECTION 1. CODE

Provisions of the Statement of Recommended Ethical Conduct for the Construction Industry and the Code of Ethical Conduct of the AGC shall be observed with specific reference to unqualified bidders, improper disclosure of bids, and fair competition.

SECTION 2. COVERAGE

Bidders included are limited to the prime contractor; and to the mechanical and electrical subcontractors, hereafter referred to as "mechanical specialty contractor," who prepare and submit bids to the prime contractor to perform and be responsible for the plumbing, heating, ventilation and air conditioning, electrical and such other work normally performed by them.

SECTION 3. SUBMISSION OF BIDS

Mechanical specialty contractors will submit to prime contractors written proposals of intent to bid, describing the precise scope of work being bid not less than 24 hours prior to the time established for submission of the prime bid, verifying the understanding of the work and materials and services to be supplied and performed by the specialty contractor. The price for the work may be included with the written proposal of intent or it may be telephoned or telegraphed in and in any event it must be given the prime contractor not later than four hours prior to the submission of the prime bid.

SECTION 4. LISTING SUBBIDDERS

The prime contractor will list the name of the mechanical specialty contractor whom he proposes to use in each of the major categories of mechanical specialty work on which bids are invited. In lieu of such listing he may submit a written statement that he has made an effort to secure subbids for the category or categories involved, setting forth that ample time was provided to the date of submission of bids or proposals, and that he had requested bids from not less than three responsible subcontractors, listing the names of all subcontractors for the category or categories involved from

AGC CONVENTION . . . continued

Nevertheless, he admitted that it would be a step forward in avoiding federal and state legislation. (Eight states already have passed laws requiring the listing of subcontractors in public works bidding.)

The joint committee's proposal was brought before AGC's membership at a meeting of the Building Division. A prolonged floor debate ensued. Setting the stage for the discussion was William P. Scott, Jr., of San Francisco, president of the Mechanical Contractors Association of America.

Scott pointed out that not all members of his association support the single contract concept.

Thus, they probably would not support a subbid plan of this type. He did say that his own company wanted to be under "the direct control of a reliable general contractor, who would coordinate not only our work but that of the other subs and, what is more important, finish the job on time." He pointed out that many others believe that "general and mechanical contractors have very little in common."

Scott hailed the subbid plan as a major step in the right direction. And he pledged to do all he could personally to promote it. He reported that the plan is under study by his association. And he



HEAVY—Vice chairman Carl M. Halvorson, chairman F. S. Oldt, and outgoing chairman Chas. Keller, Jr. get together.

BUILDING — Vice chairman Fred W. Mast, Waterloo, Iowa, congratulates new chairman Carl W. Olson, Lincoln, Neb.

HIGHWAY — R. W. McKinney of Nacogdoches, Tex., vice chairman, shakes hands with Hal L. Royden of Phoenix, chairman.



Divisions' New Officers For the Coming Year

HOW TO HANDLE

WET JOBS

#54 of a Series

Project: Sewage Treatment Plant, Jacksonville, Fla.

General Contractor: Sullivan, Long & Hagerty, Birmingham, Ala.

Engineers: Metcalf & Eddy, Boston, Mass.



Despite large volume of air entering wellpoint system...

One Pump Controls 24' of Water on big job

Predrainage requirements for this wet site were as follows:

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(2) Use single-stage system (not expensive two-stage system) inside a 2,000-ft perimeter. (3) Handle large air volume in the pumping. (4) Install wellpoints in sand wicks to operate dependably in the job-site's fine sand and clay.

• The Griffin plan used by the contractor—and supervised by a Griffin specialist—was based on long experience in the region.

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said that he understood the National Electrical Contractors Association has found the proposal consistent with its policies and "shortly will announce that it has recommended it to its chapters for implementation at the local level."

The plan actually was presented to the AGC membership by S. F. Nielsen of San Diego, co-chairman of the CMSCI-AGC joint cooperative committee. Former AGC President C. P. Street of Charlotte, N.C., a member of the committee, hailed the effort as an important action for the construction industry. And he emphasized that it would be a voluntary plan. Street moved that the building division session approve the proposed procedures "in principle, leaving the authority with the executive committee to change wording as may become necessary and desirable, and the authority to activate these proceedings when final wording is accomplished and final approval given by the various organizations participating in the national joint cooperative committee, CMSCI-AGC."

After a prolonged floor debate lasting nearly 2 hr, the motion was approved by a vote of 99 to 78. But this was not the action of the entire AGC membership because it was taken by a session of the Building Division.

SubBid Plan . . . continued

whom he had requested or received sub-contract bids or proposals and further stating that he received less than two definite, complete, or responsive bids for such category or categories involved as provided for in Section 3.

SECTION 5. SUBCONTRACTOR RESPONSIBILITY

The prime contractor may require the mechanical specialty contractor to provide a bond to fulfill his proportionate share of the obligation assumed toward the owner, and may require the mechanical specialty contractors to fulfill the same naming requirements, that is the naming of the sub-subcontractors being considered to perform various phases of the work involved. The fact that mechanical specialty contractors must fulfill this requirement shall be so noted in the invitation to the mechanical specialty contractors to bid on the work.

On the final day of the convention a resolution drafted by President Cawdrey was approved by AGC membership as a whole. This resolution watered down the method of implementation of the plan. It will not be recommended to the American Institute of Architects nationally. Nor will any other similar plan. And the resolution recommended that local chapters adopt a plan of this sort only where local mechanical specialty groups give wholehearted support for the single contract system.

Closeness of the building division vote, and discussion preceding it, showed that AGC members are widely divided on the subcontractor listing plan. Some feel that even a voluntary program of this sort will encourage federal and state legislation requiring listing of subbids. Others believe that plans already in effect in their localities are good and adequate and should not be tampered with. Still others feel that a formal subbid procedure would straitjacket them in preparing their tenders.

It is not certain what the next step will be. But a lot of excitement was created by AGC's consideration of the proposal. And it may well be that the plan or a similar one will be resubmitted to the national organization at some future date, particularly since such a plan has now been so dramatically spotlighted.

Labor Developments

There was a conspicuous absence of extensive open discussion on labor matters at the AGC convention. No union leader addressed the group as had been the case frequently in the past. Members were urged to oppose the Kennedy bill (S2643) in the Senate and the Thompson bill (HR 9070) in the House, which would legalize the secondary boycott in the construction industry. Sen. Kennedy in a recent address before a national meeting of the building trades unions said that he was determined to bring this bill to a vote at this session. And, as he has strong support in Congress, AGC and its members have a battle ahead of them if they are to retain the provision of the Taft-Hartley Act that outlaws secondary boycott strikes by unions.

In his committee report, labor committee chairman Frank J. Rooney discussed the formation of the Construction Industry Joint Conference. This group is comprised of representatives of 15 management organizations in the construction field and 18 presidents of international building trades unions. CIJC is presently working on machinery that would prevent or delay strikes. This would be a voluntary plan embodying the no strike-no lockout principle during the processing of a dispute. Such a plan would be similar to the National Joint Board for the Settlement of Jurisdictional Disputes, but would not cover jurisdictional disputes.

The plan was strongly endorsed in a statement by AGC President James W. Cawdrey as being an important step by labor and management in seeking to strengthen the contract method of construction and to safeguard construction markets. The plan is still in its developmental stage and no estimate was made as to when it might go into effect.

AGC, in a resolution, expressed concern over the low rate of training qualified craftsmen through apprenticeship programs. It urged its local chapters to take positive action to promote and encourage apprentice training. And AGC also urged the printing of a United States postage stamp in recognition and commemoration of apprenticeship.

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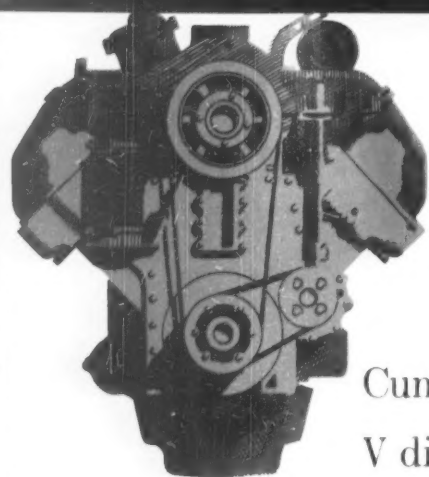
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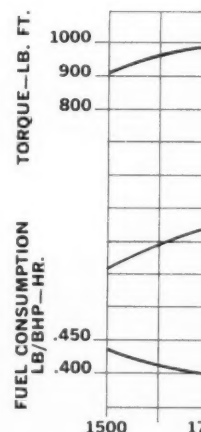
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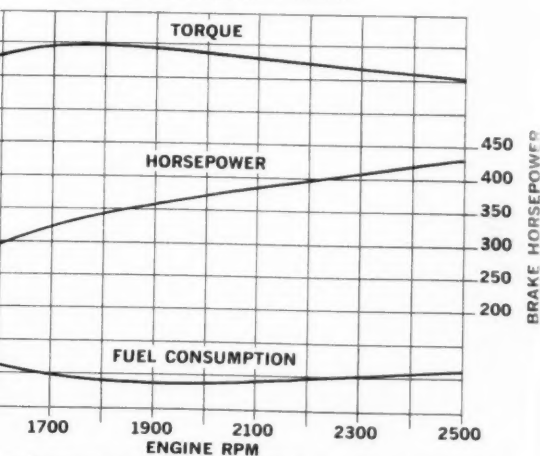
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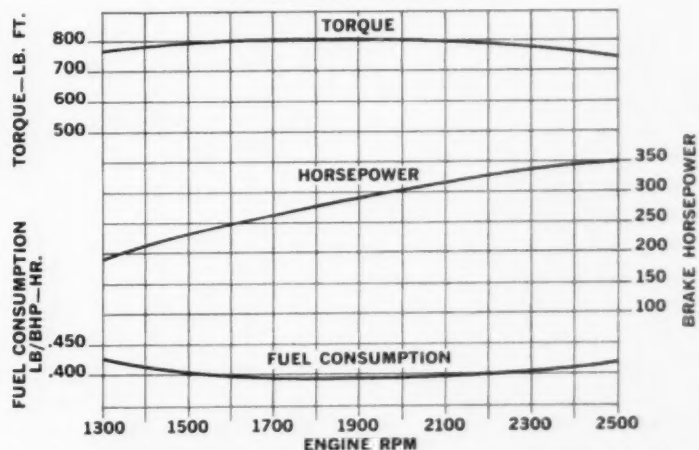
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Ratings corrected to conditions of 29.92" hg (sea level) barometric pressure; 60° F intake air temp.

**Overpass at
Milwaukee
Avenue**

To bypass a railroad around a tight work area, the contractor built a narrow embankment consisting of two walls of sheet piling tied together with rods and filled with earth.

BEGINS ON PAGE 116



On Chicago's Northwest Expressway ...

Confined Job Sites Don't Stop Tricky Bridge Builders

**Overpass at
Addison Street**

Long steel girders were too heavy to be placed by crane from the rim of the excavation. So, specially built rolling towers supported the girders and jockeyed them into position.

BEGINS ON PAGE 120



AT MILWAUKEE AVE.

Tie Rods Support Sheet Piling For Narrow Embankment

Bypassing a railroad around a confined job site without obstructing it took some tricky construction. To eliminate buttresses and braces in the working area, the contractor installed double walls of sheet piling, tied them together with steel rods, and filled the enclosed area with earth.



EMBANKMENT WALL — Outer wall of sheet piling is set and driven while crawler tractor digs ditch for inner wall.

FOUNDATION EXCAVATION—Work starts on the foundations for new overpass after the sheet-pile-retained embankment is in place carrying the relocated railroad around the job site.

LACK OF SPACE at the Milwaukee Ave. job site forced the contractor to build an unusual embankment for bypassing a railroad around the working area. It is made up of two walls of sheet piling tied together with steel rods and filled with earth. No external braces except wales are necessary.

Robert R. Anderson Co. of Chicago holds the \$5¼ million contract for the three-level grade separation structure. It will carry the C&NW Railroad over the new Northwest Expressway and under an elevated section of another street. To handle the sharp angles of intersection at the grade separation, the structure consists of three staggered concrete tubes.

The contractor wanted to bypass the railroad around the site without obstructing it. Building the embankment with sheet piling supported by buttresses and raker braces extending into the working area was ruled out because Anderson wanted to use traveling steel forms to pour the bridge decks. So they devised the unusual embankment.

The 2,000-ft-long curved embankment is about 65 ft wide. The steel sheet piling was furnished on a rental basis by the L. B. Foster Co. The unique embankment construction has proved to be a success, and the job is nearing completion now.

The bridge site had to be excavated down to about 25 ft along the inside of the curved embankment. To secure this side of the embankment, the inner wall of piling was installed much deeper than the outer one. MZ-38 sheets 57 ft long were driven to an average penetration of about 45 ft for the inner wall, while MZ-27 sheets 30 ft long were sufficient for the outer wall.

Straight panels of piling were first set up in a 30-ft-long steel templet. To make the curved wall, panels were first driven as a series of chords. Two Bucyrus-Erie cranes handled most of the pile driving. A Vulcan 50C hammer was used to "tack" the piles and an 80C to drive them home. The cranes were equipped with 120-ft booms for setting the sheets and 60-ft booms for driving.

Tops of the embankment walls are about 15 ft above ground level. Most of the earth filled between the walls came from the adjacent excavation. Dump trucks placed the fill, and rollers compacted it.

Two levels of tie rods hold the walls in place. The upper level is about 11 ft below the tops of the sheets and consists of 2¾-in. round rods spaced 9 ft 9 in. apart. Outside wales are 15-in. 34-lb double channels. The lower-level rods are 3½ in. round, 9 ft 9 in. apart, with double 18-in. 58-lb channel wales. The rods were installed when enough fill was in place to complete the portion of the embankment below each level of tie rods.

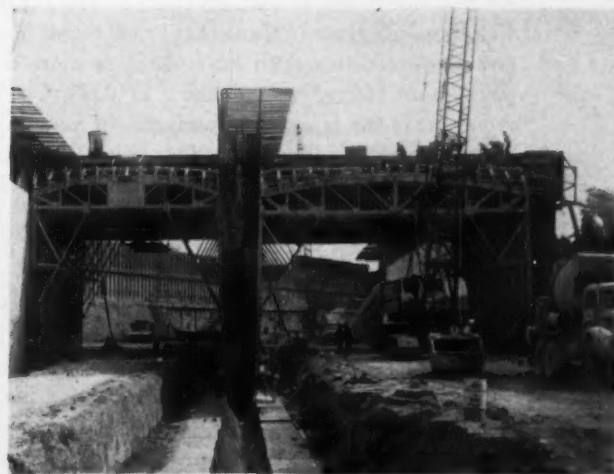
When excavation was completed, Anderson began the job of drilling more than 2,000 foundation piles. A Ka-Mo electric-powered auger drilled the 16-in. piles to an average depth of 20 ft. The auger rode a spud lead hung from the boom of a P&H 655 crawler crane. Holes were covered with a steel plate until concreted. Several holes at a time were filled with concrete chuted directly from transit-mix trucks. The piles were capped with concrete footings.

Building the unusual rigid frame bridge to carry the railroad over the new expressway was the next big job. One of the first and most advanced appli-

continued on page 120



← **WALL FORMS** — A Bucyrus-Erie truck crane erects prefab forms for the rigid frame bridge walls. The walls are 3½ ft thick at the base and 5½ ft thick at the top.



DECK FORMS — Blaw-Knox traveling steel forms hold concrete for the bridge decks. Each of the three forms is 64 ft long and 33½ ft high at the center of the span.

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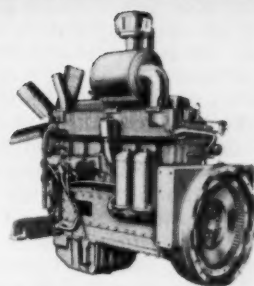
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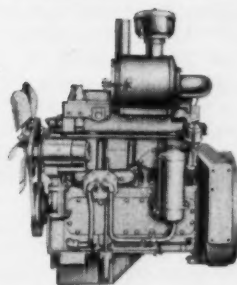
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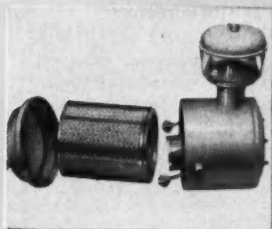
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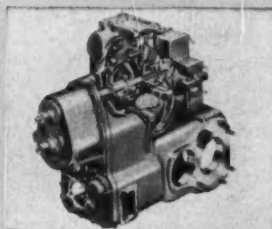
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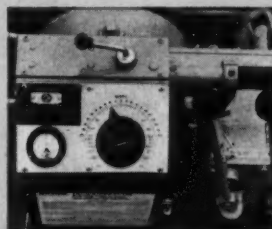
OTHER HIGH-PRODUCTION FEATURES IN CAT MOTOR GRADERS



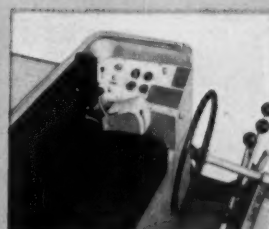
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AT MILWAUKEE AVE....

continued from page 117

cations of rigid-frame bridge construction in the Midwest, the structure consists of three 400-ft-long tubes staggered in echelon. The span of the outer tubes is just under 50 ft, and the center span is 31 ft. The height is 33½ ft.

Walls are 3½ ft thick at the base and enlarge to 5½ ft at the deck slabs. Slabs are parabolic arches 7½ ft thick at the walls and 4 ft thick at the center.

Many factors affected the selection of forms to support the heavy slab pours. The rigid frame design required that slab pours over intermediate walls be monolithic. This meant that some pours had to be carried over two and even three tubes at the same time.

Weight of concrete was another factor. The huge slabs impose a load of 750 lb per sq ft on the form. Keeping the small site open for movement of materials and equipment during concreting was another problem. This immediately ruled out shores, scaffolds, and similar supports.

Anderson selected a set of three Blaw-Knox traveling steel forms for the concrete work. Each form is 64 ft long and consists of 14 trusses supported on columns and knee braces. The forms move on 8x15-in. rubber-tired wheels that ride on the concrete bridge footings. A 3/16-in. skin plate forms the slab's parabolic arch. It is supported by 6-in. Junior beams that span between the trusses. Banks of 25-ton jacks housed in the base of the form assembly raise and lower it.

The sequence of pours is scheduled carefully for most efficient use of the forms. Pours must cure for 10 days before forms can be stripped, and detailed planning is essential to maintain a schedule of one pour a week. The two largest pours required about 1,200 cu yd of concrete and simultaneous use of all three travelers. Each traveler will be reused about seven times to complete the structure.

General superintendent for Robert R. Anderson Co. is James June. Neil Hennegen is the superintendent, and Ernest J. Hennings is chief engineer. Walter Potokar is the County Engineer, and William J. Mortimer is Superintendent of Highways for Cook County. The Cook County Department of Highways designed the structure.



AT ADDISON ST.

Rolling Towers Position Long Girders

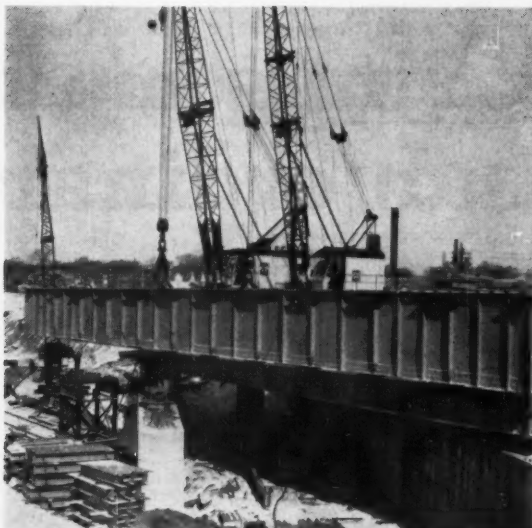
Cranes at the rim of an excavation were unable to place heavy 141-ft-long steel girders for a railroad overpass. To accomplish this operation, specially designed rolling falsework towers wheeled the girders into position.

HIGH ABUTMENTS on the east and west, plus railroad embankments on the north and south, restricted the working area of a Bethlehem Steel Co. bridge crew erecting a steel girder overpass at another point along Chicago's Northwest Expressway. Specially designed rolling falsework towers were necessary to move the big girders into position.

The job involved the relocation of four mainline tracks of the C&NW Railroad at Addison St. At this point the expressway is depressed below the level of the surrounding streets and forms a hole about 120 ft wide, 500 ft long, and 25 ft deep.

It was impossible to deliver or erect the 4,000 tons of structural steel for the five-span overpass from the surrounding ground, and the design permitted no field splices. So Bethlehem Steel had to erect 41 long steel girders over the top from a single access point at the east end of the site.

Ironworkers arrived on the job after the concrete abutments and piers for the overpass were in place



MOVING A GIRDER—One railroad flatcar holds each girder and is moved out as far as possible on the erected portion of the overpass (**left**). Then, two cranes pick up the girder and lower it with one end on a rolling tower and the other on one pier (**above**). Next, rolling tower moves one end while crane carries the other end of the girder until it spans between the two piers (**below**).

Span 1 is made up of 9 girders and carries four tracks. A pair of girders carries each mainline track; the extra girder supports an industry lead track off main Track 4. Each girder is 82 ft long and 6 ft 8½ in. deep and weighs about 33 tons.

Girders arrived in pairs on rail cars. The railroad had previously constructed a turnout and extended Track 2 to the east abutment to serve as a construction spur. Bethlehem crews extended this track onto the bridge as work progressed.

Span 1 required no falsework. An 80-ton crawler crane working on the ground from behind the east abutment simply lifted the girders off the rail cars and placed them on the piers. The crane's 60-ft boom made this an easy reach. Field connections were made with high strength bolts. Seven girders were erected in this manner. Two girders were purposely omitted at Track 1 to provide a slot for sliding through the long girders of Span 2.

The rolling falsework towers were necessary for Span 2. Its eight girders, each 141 ft long, 10½ ft deep and weighing up to 107 tons, could not be placed by the 80-ton crane working from behind the east abutment. A pair of cranes working from behind Span 1 could not handle these girders either.

Instead, each girder for Span 2 arrived singly on three rail cars. The triple load was shored up

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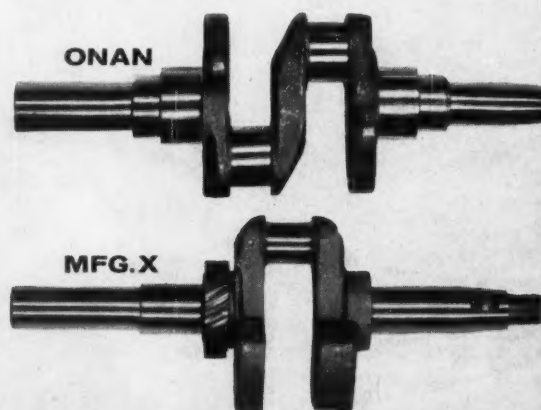
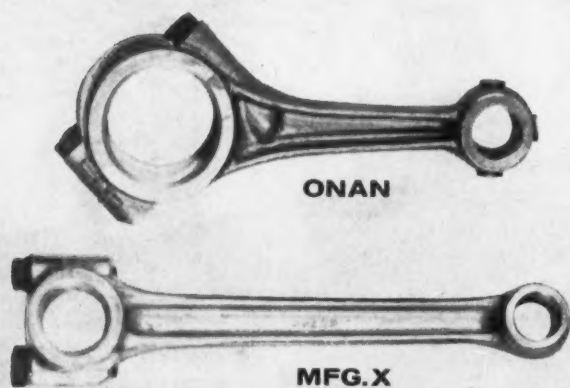
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Look at the brawn in this Onan bearing from a 20 HP engine—more than twice the bearing area of most competitive bearings. Look at the built-down-to-a-price bearing from a 20 HP competitive engine. It's about half the size. Which bearing do you think would last longer?

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AT ADDISON ST....

continued from page 121

on the two outside cars; the center car was simply an idler, but of heavy-duty construction. At the site, the crew transferred the girder shores to the center car so that it alone carried the load. The end cars then were removed: The front car was picked off with a crane; the rear car simply was backed off onto the construction spur. The 141-ft-long girder extended well beyond the single rail car supporting it at its midsection.

The car was pushed out on Span 1 as far as possible on the work track adjacent to the open slot. A 50-ton and an 80-ton crawler crane then moved out on Span 1 on timber mats, picked up the girder and lowered it into the slot. The back end of the girder rested on the east abutment but the leading end was placed on the No. 1 rolling falsework tower and guyed to it with $\frac{3}{4}$ -in. wire rope.

The tower stands about 12 ft high. It is an 8-ft-square latticework of 10WF33 beams and columns, with angle diagonal bracing. It rolls on a ground-level 110-ft track in Span 2. Track is composed of 115-lb rail, 6 ft c-c, and runs parallel to the long dimension of the bridge.

With the leading end of the girder resting securely on the tower atop grillage and timber blocking, the 80-ton crane on Span 1 picked up the end of the girder. Then the crane walked and the tower rolled, slowly moving the girder until it was over Span 2. The girder rolled at an elevation of about 3 in. above the shoes on the piers. Two 5-ton hoists pulled the tower during the move.

Next step was to shift the girder transversely to its proper position in the span. The outside girder had to be moved as much as 80 ft. This move was made similarly to the longitudinal move, except that two towers on two tracks supported the girder. The transverse tracks, 110 ft long, were spaced 20 ft apart parallel to the piers. These tracks cross the longitudinal ones at about 30 deg. Bethlehem crews elevated the transverse tracks above the longitudinal ones and fabricated removable sections to fit over the longitudinal track. By either installing these sections or removing them, the bridge crews could move the girder in the direction desired.

A 40-ton crawler crane handled the removable track sections. The crane was squeezed into the work area at ground level between the piers through an opening in the railroad trestle. This crane also erected the falsework towers and helped move equipment and materials and track sections in the hole.

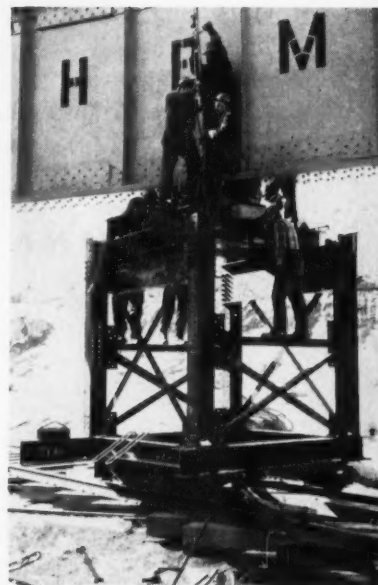
To make the transverse move, the cross-over track sections were put in place. Then falsework towers No. 2 and No. 3 were rolled under the girder while it rested on the No. 1 tower and the east abutment. Towers No. 2 and No. 3 are each equipped with two 50-ton jacks. These vertical jacks raise the girder off its temporary blocking. Then the towers are winched down the tracks, carrying the girder. When the girder is in position, the jacks lower it onto its shoes.

One 5-ton hand hoist moved each falsework tower.

Removable Track Sections Help Girders Change Direction



TOWER TRACKS—At the end of each longitudinal move the crew installs a removable section of transverse track so other rolling towers can move the girder.



ROLLING TOWER—Columns, WF beams, and angle braces make up each 8-ft-square tower. Jacks raise and lower the girders onto the falsework towers.

A Bethlehem shop made T-shaped adapters for the hoists so they could be used with air motors instead of hand cranks. The adapter spindle fits into an air drill, while the adapter head fits into the hoist.

Other girders were moved into position in the same manner. After all eight girders for Span 2 were in place, Bethlehem ironworkers went back to Span 1 and erected the two girders that had been omitted originally to provide the slot for the erection of Span 2.

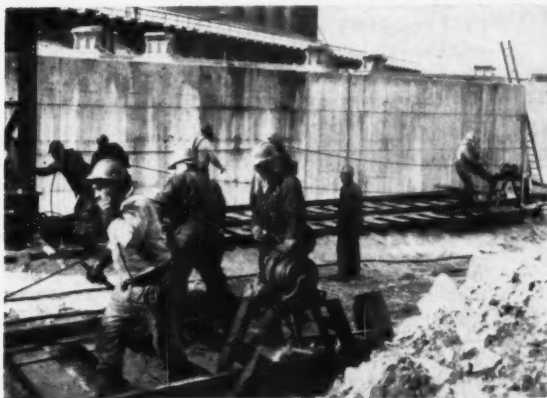
Next the crews filled in the floor system for Span 2. Floor beams are 16WF50, with $\frac{5}{8}$ -in. floor plate. Then they placed timber and trackage to move the crane into position for erecting Spans 3 and 4.

Span 3 is made up of eight girders—each 69 ft long, up to 8 ft deep, and 22 tons in weight. The



PULLING POWER — Workmen secure winching line from hoist to rolling tower.

TRANSVERSE MOVE—Two rolling towers carry the girder during the transverse move. Jacks on towers hold the girder just above piers and lower it in place after the move.



80-ton crane and the 50-ton crane joined forces to erect this span.

Erection of Span 4 was similar to Span 1. Only six of the eight girders were erected, leaving an access slot for the erection of Span 5. Span 4 is made up of eight 85-ft-long girders up to 8 ft deep and weighing 31½ tons. A crane working from the preceding Span 3 erected these girders.

Span 5 was erected similarly to Span 2. The 109-ton girders span 144 ft and are up to 12 ft deep. Span 4 was erected after the completion of Span 5. Then the floor system was installed for the new trackage.

Steelwork was under the direction of H. E. Crider, manager of erection, Western Erection District, Fabricated Steel Construction Div., Bethlehem Steel Co. E. E. Lewis was resident engineer.

Contractors Crane & Rigging Co. now has available in their Santa Ana, El Monte, Ontario and Rialto yards, two 80-ton P&H truck cranes with 250' booms, one 60-ton with 200' boom, one 50-ton P&H truck crane with 180' boom and five 35-ton P&H truck cranes with 160' booms. With the largest array of truck cranes in the United States, CC&R meets the needs and specifications of any job in their four-yard area.

User: MOUNTAIN ROCK COMPANY
Equipment: 60-TON P&H 595-TC TRUCK CRANE (owned and operated by Contractors Crane & Rigging Co.)
Project: Digging and loading rock at crushing plant, Claremont, Calif.



Contractor: CARTER COMPANY
Equipment: 35-TON P&H 555C-TC TRUCK CRANE (owned and operated by Contractors Crane & Rigging Co.)
Project: Office building construction in Pasadena, Calif.



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Contractor: CLYDE WOODS

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CRANES (owned and operated by
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Project: Setting slip form for San
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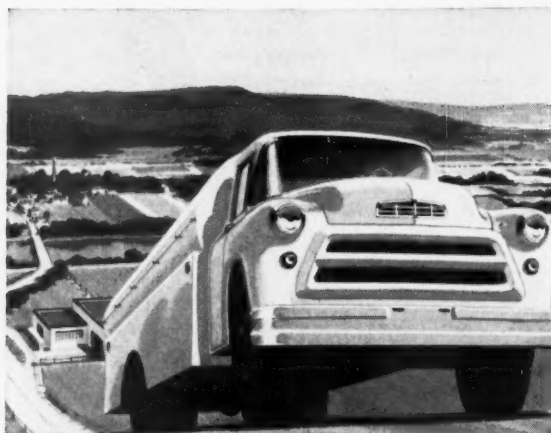
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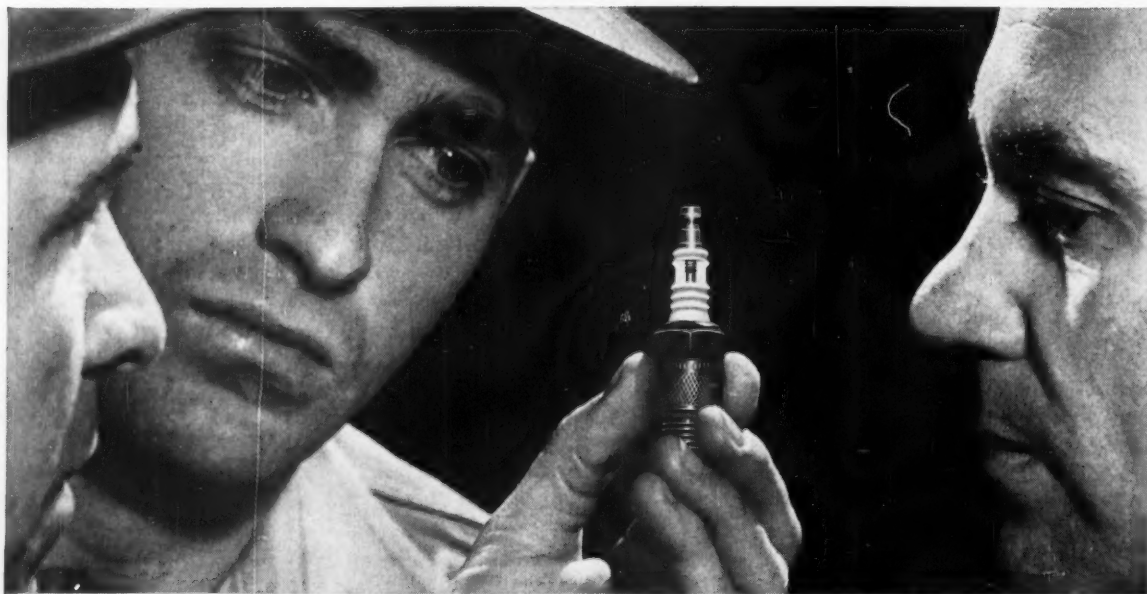
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Champion representative uses cutaway to explain how auxiliary-gap Champions build up voltage internally to combat excessive fouling.

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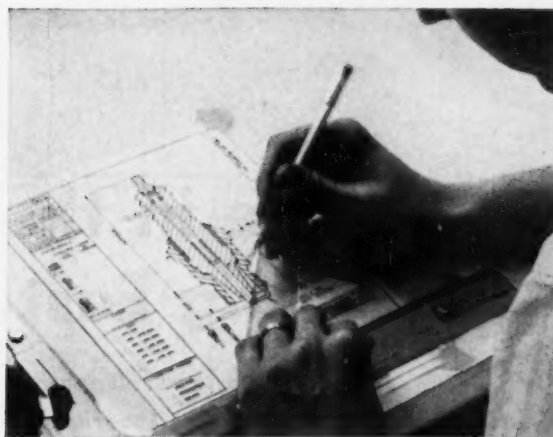
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performance and cut costs

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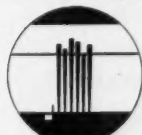
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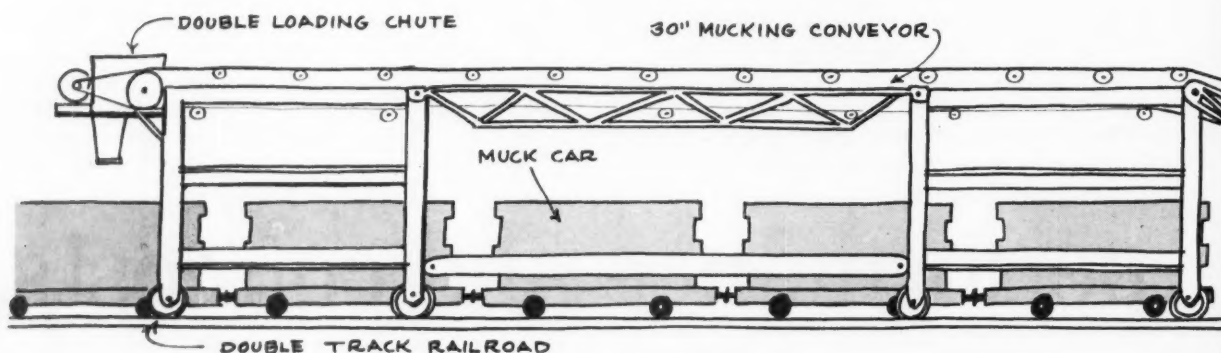
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Backhoe in the Shield Helps Dig East Boston Tunnel

To speed muck handling on their \$30-million East Boston Vehicular Tunnel job, Perini Corp. built a backhoe right into the tunnel shield. The rig is a modified Pippin backhoe, originally designed to be attached to the back of a tractor.



A MODIFIED BACKHOE, mounted inside the shield to load muck onto a conveyor, is an interesting innovation on Perini Corp.'s current job of driving the second tube of the East Boston vehicular tunnel.

The rig is a greatly modified Pippin backhoe originally designed for mounting on a tractor. Perini has substituted an almost flat plate for the bucket so the rig pulls rather than shovels the muck onto the conveyor. Both arms of the backhoe have been considerably stiffened.

Perini is driving the \$30-million tunnel for the Massachusetts Turnpike Authority. It is parallel to and similar in design to the existing Sumner Tunnel that connects Boston and East Boston. In effect, it forms a second tube of the Sumner Tunnel, but it will be known as the Lt. William F. Calahan, Jr., Tunnel, after the late son of the present Turnpike commissioner.

The 31-ft OD tunnel goes

through clay that generally is stiff, although it will become more fluid and silty in the deeper sections. Perini is driving the whole tunnel from the East Boston end and they have progressed about 1000 ft. So far they are not under air but they will be shortly. They do not expect that the pressure required will exceed about 25 psi.

Operations at the Shield

The backhoe is mounted on a frame set between the two main vertical members of the shield. The operator sits on top of the frame. The lower end of an inclined muck conveyor extends inside the shield, under the operator and backhoe frame, so all of this phase of the mucking operation is handled inside the shield.

This requires much less space than the mucking machine Perini originally planned to use. It allows the liner plate to be installed immediately behind the shield as soon as the shield is moved.

The backhoe, with its 18-in.

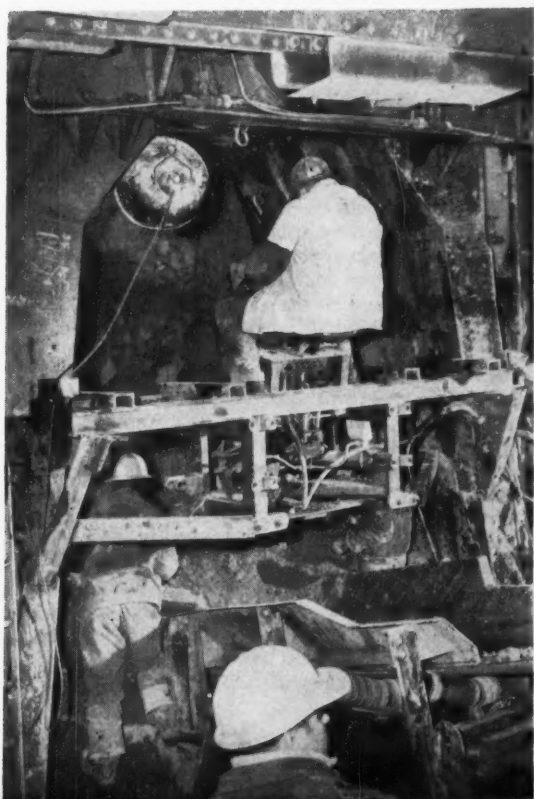
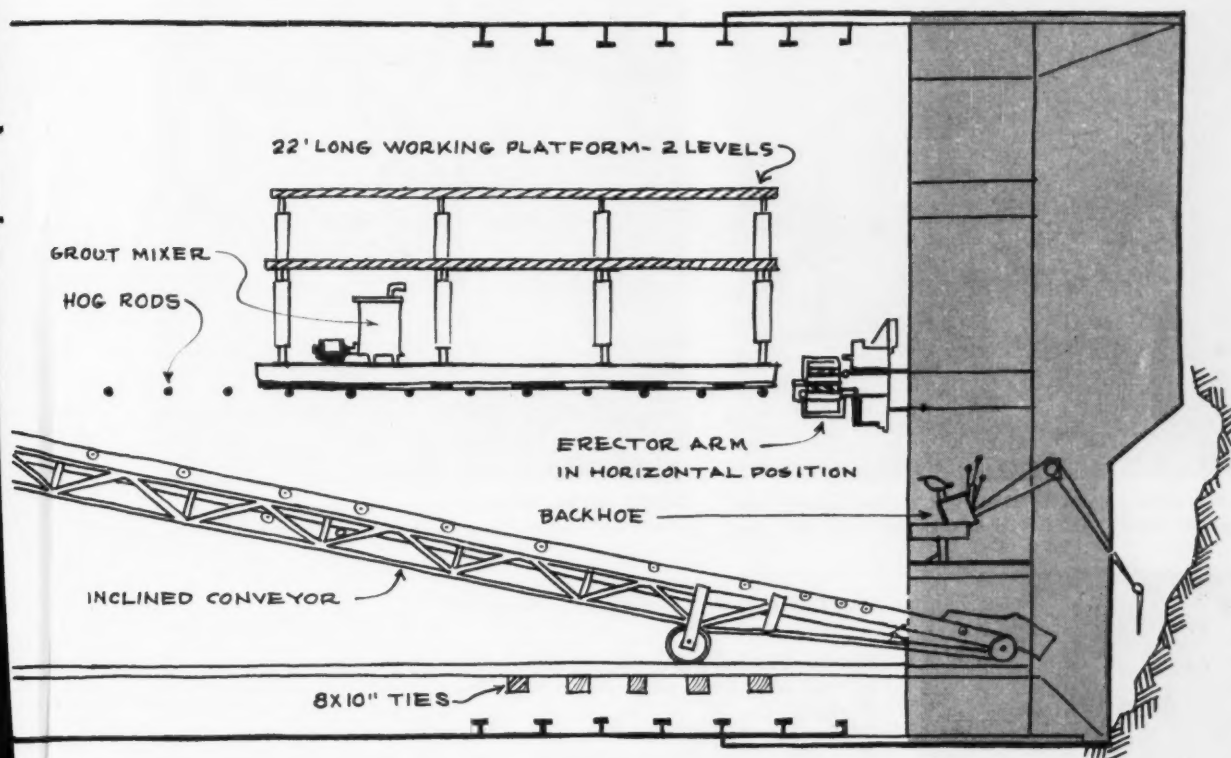
wide, slightly curved plate, digs the face within its working radius. Men with pneumatic spades cover the rest of the face. They chisel the clay loose and it falls down in front of the backhoe, which pulls it onto the conveyor.

The shield is a more or less standard type made by the American Locomotive Co. It is 31 ft OD. Around the rear perimeter are mounted 28 hydraulic jacks of 200 tons capacity each. Four of the jacks are pivoted and can be turned to steer the shield or correct rotation.

In the hard clay they are now in, the crews remove about 80 cu yd from the face for each shove of the shield. This becomes about 140 cu yd of loose material. The three 8-hr shifts make about five shoves of the shield per day. Each shove advances the shield about 32 in.

Liner Plate

The liner plate comes in 32x108-in. sections weighing 1,500



Modified Backhoe

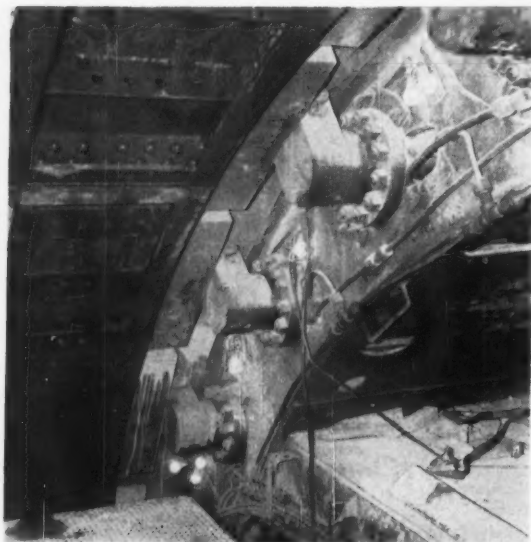
SUPPORT FRAME—Operator sits on top of control mechanism set on steel frame inside shield. He loads muck directly onto the conveyor that starts well inside shield.



MODIFICATIONS

—Perini almost rebuilt the arms of the backhoe to strengthen it (above). They substituted an 18-in. wide plate for the bucket (below).

After Jacks Advance Shield, Crews Grout Annular Void



JACKS—Shield is moved by 28 jacks of 200 ton capacity each. At present, shield makes about five 32-in. shoves per 24-hr day.



GROUT MIXER—Crews mix grout and gravel in rig atop the upper work platform. The materials come in by rail and conveyor.

EAST BOSTON TUNNEL . . . *continued*

lb each. The plate was fabricated by the Commercial Shearing and Stamping Co.

Two rigs handle the installation. On a skid platform behind the shield is mounted an Austin-Western 4-ton hydraulic crane, minus its carrier. It removes the plate sections from the rail cars that bring them into the tunnel and deposits them within reach of a hydraulically-operated erector arm on the back of the shield. The arm is pivoted at the centerline of the tunnel and can swing 360 deg to reach any point on the perimeter. At one end is a jaw that locks onto the back of the liner plate under the flanges and holds the plate rigidly in position parallel to the tunnel wall as it moves it into position for bolting. At the other end of the arm is a counterweight. The arm can telescope itself to clear obstructions such as the muck conveyor.

The platform that carries the 4-ton crane is about 22 ft long and has two working levels. It was designed both to carry the men that bolt the liner plates together and also to hold two major items of equipment. One is the crane; the other is a mixing vat for gravel and grout.

This mix is pumped into the approximately 4-in. annular void

between the liner plate and the excavated wall of the tunnel. Until this grout goes in, the circular liner plate walls have a tendency to flatten into an egg shape under their own weight. To prevent this until the grout can be inserted, Perini ties the two sides together with 2-in. horizontal hog rods about every 3 ft along the centerline of the tunnel. The rods also serve to carry the work platform.

Mucking

The backhoe pulls muck onto a 40-ft-long, sloping, 30-in. rubber belt conveyor that elevates the material about 11 ft to another conveyor atop a train of two jumbos.

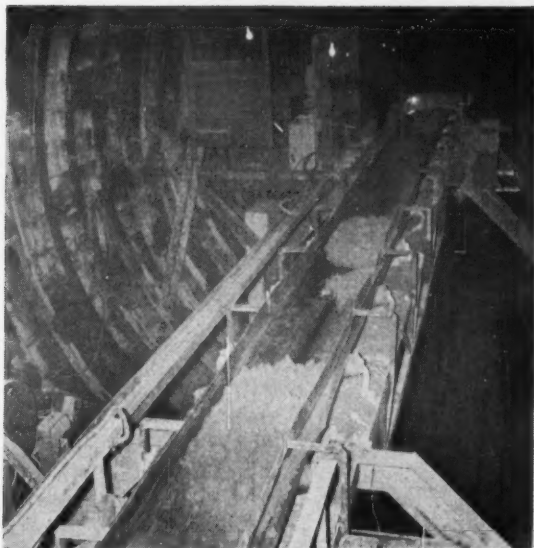
The train consists of two 24-ft-long, rail-mounted jumbos connected by an overhead truss frame and a pair of 8-in. WF beams pin-connected near the bottom. Along the top of the jumbos and the truss frame runs a 30-in. conveyor that carries muck from the sloping belt to an inverted Y-shaped pair of loading chutes at the back end.

The jumbos straddle a double-track railroad that carries the muck cars. A train of five 6-yd cars can get under the jumbo train on each track. Loading starts with the car farthest from

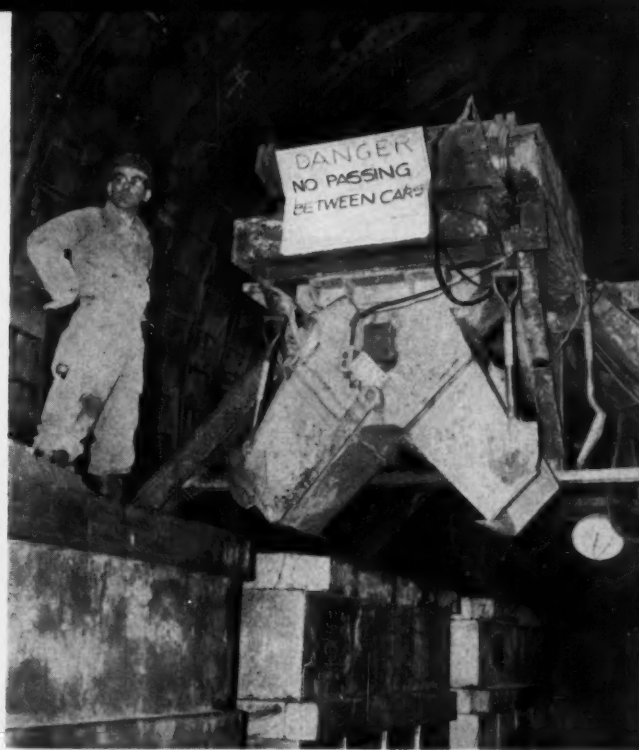


GROUTING—Man connects grout pipe to threaded hole in liner plate. Grout and gravel are pumped in to fill 4-in. void between liner plate and outside of excavation.

Muck Handling is Mechanized From Start to Finish



CONVEYOR BELT—Muck travels along 30-in. belt between two jumbos after being elevated on conveyor. Cars pass underneath.



CHUTE GATES—At end of horizontal belt, man loads muck cars on either of two tracks through a double chute with a flip-flop gate.

the face of the tunnel and the muck train is pulled back to load the remaining cars.

One gate of the dual chute feeds cars on one track; the other gate is set over the other track. A flop gate directs the muck to whichever train is to be loaded.

Each muck train is hauled by a General Electric 8-ton battery-driven locomotive. Perini has two of these locomotives on the job now. They probably will have five or six eventually.

The trains carry the muck back to the shaft. A Marion 111-M crane on the surface picks the box of each muck car off its carriage and hoists it to the surface. It makes one stop at the surface so a man can attach a second line to the box for tipping. Then the crane swings the box around and dumps the load in a pile near the street. A Michigan 175-A front-end loader transfers the muck to trucks for removal.

Surface Plant

The surface plant is contained in a Butler 80x120-ft prefabricated building. One metal wall of the building has been replaced with a concrete block wall to carry the electrical switchgear.

Perini has set up two Ingersoll-Rand 10,000-cfm compressors to

provide the main low pressure (50 psi max) air supply. As standby equipment, they have six 1,000-cfm compressors. These machines are Joy WN102's, each with a second low stage substituted for the normal high stage. None of this equipment has been used yet, but it will be when the tunnel operation has to go under air.

Four Model WN102 Joy compressors supply 130-psi air for the air tools. All the compressors in the plant are powered by electricity. They were built originally for a Perini job in a part of Canada with a 550-v power supply. To use them in Boston, a system of transformers adapts them to 440-v power.

Power Supply

Perini buys 13,800-v power for this job from the Boston Edison Co. and converts it through transformers to whatever voltage they require for the various machines. They obtain the power from three independent stations of the power company as a precaution against a breakdown of one source.

Water for the hydraulic equipment also comes from two sources in the Boston city system for the same reason. The high-pressure

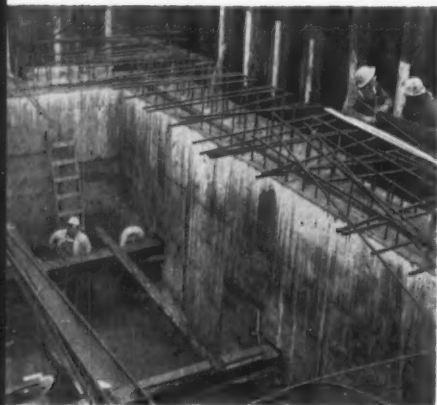


EMPTYING CARS—At bottom of shaft, crane puts empty muck box on carriage.



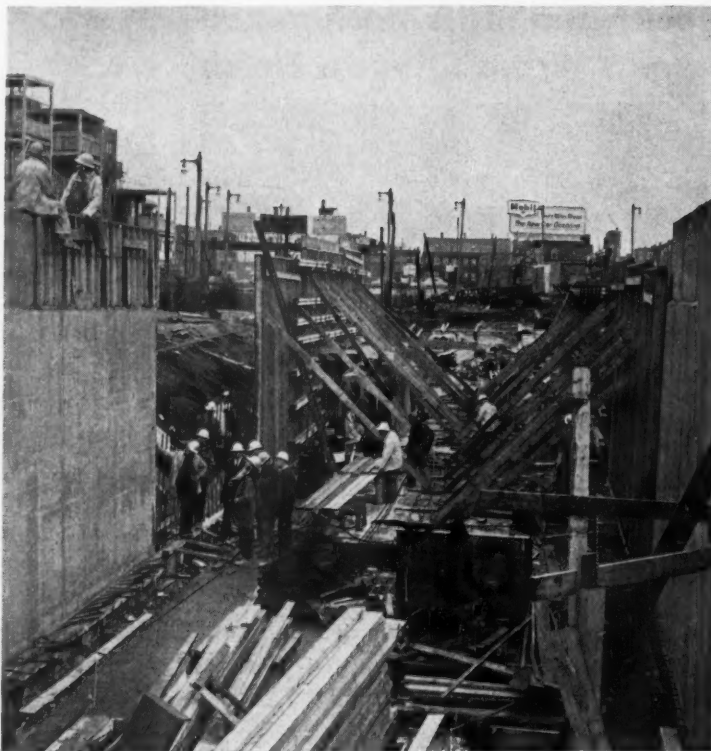
MUCK REMOVAL—On surface, Michigan loader transfers muck from pile to trucks.

Job Includes Entrance Ramps



BRACING—H-beam bracing for sheet pile retaining wall is left in place while concrete walls are poured. Later the braces will be removed and the holes grouted.

OPEN CUT—Shallow section of ramp does not require sheet piling. Concrete walls are formed with plywood panels braced with timbers. The walls have a two-way batter.



EAST BOSTON TUNNEL . . . *continued*

water system is handled by two Worthington pumps in the surface plant that send water at 5,500 psi through a 2-in. line to the shield. In the plant, one standby storage tank and one pressure storage tank complete the circuit.

Service Lines

The return line of the 2-in. high-pressure water system is a 4-in. line that carries water at normal street pressure. It doubles as a supply of service water for operations at the shield. Water flows in either direction in this line depending on how it is used.

The 2-in. line is rigid for most of its length but the last section is a flexible pipe. This allows the shield to make four or five moves before a new section of rigid pipe has to be added.

A 6-in. water line removes ground water that has been collected in sumps and pumped out with an Ingersoll-Rand air-operated mud pump. There has been very little seepage of water so far, partly because the clay is tight and partly because the existing Sumner Tunnel, 100 ft c-c away, cuts off a good part of the ground-water flow.

Entrance Work

The job includes about 500 ft of ramp and roadway work at each end of the tunnel. For the most part it is open-cut operation and is fairly straightforward.

At the East Boston end, the depth of the entrance ramp below ground surface varies from 18 to 50 ft. In the deeper cuts Perini drove ZP32 sheet piling along both sides of the roadway and excavated inside it. Now they are building the concrete retaining walls and floor.

They braced the deeper sheet piling with a double row of 12 to 36-in. WF walers with 10 to 18-in. braces. About half the distance was shallow enough so that no sheeting was required and the work is being done in a cut with sloped sides.

The concrete walls are 1 ft thick at the top and vary from 2½ to 4 ft thick at the bottom. Both sides are battered. The highest section is about 28 ft. The specifications require that the walls be poured in one lift. Perini pours right around the braces. They form a 3-ft box around each brace. When the wall has set, they remove the braces and grout in the 3-ft holes.

Wall forms are plywood panels,

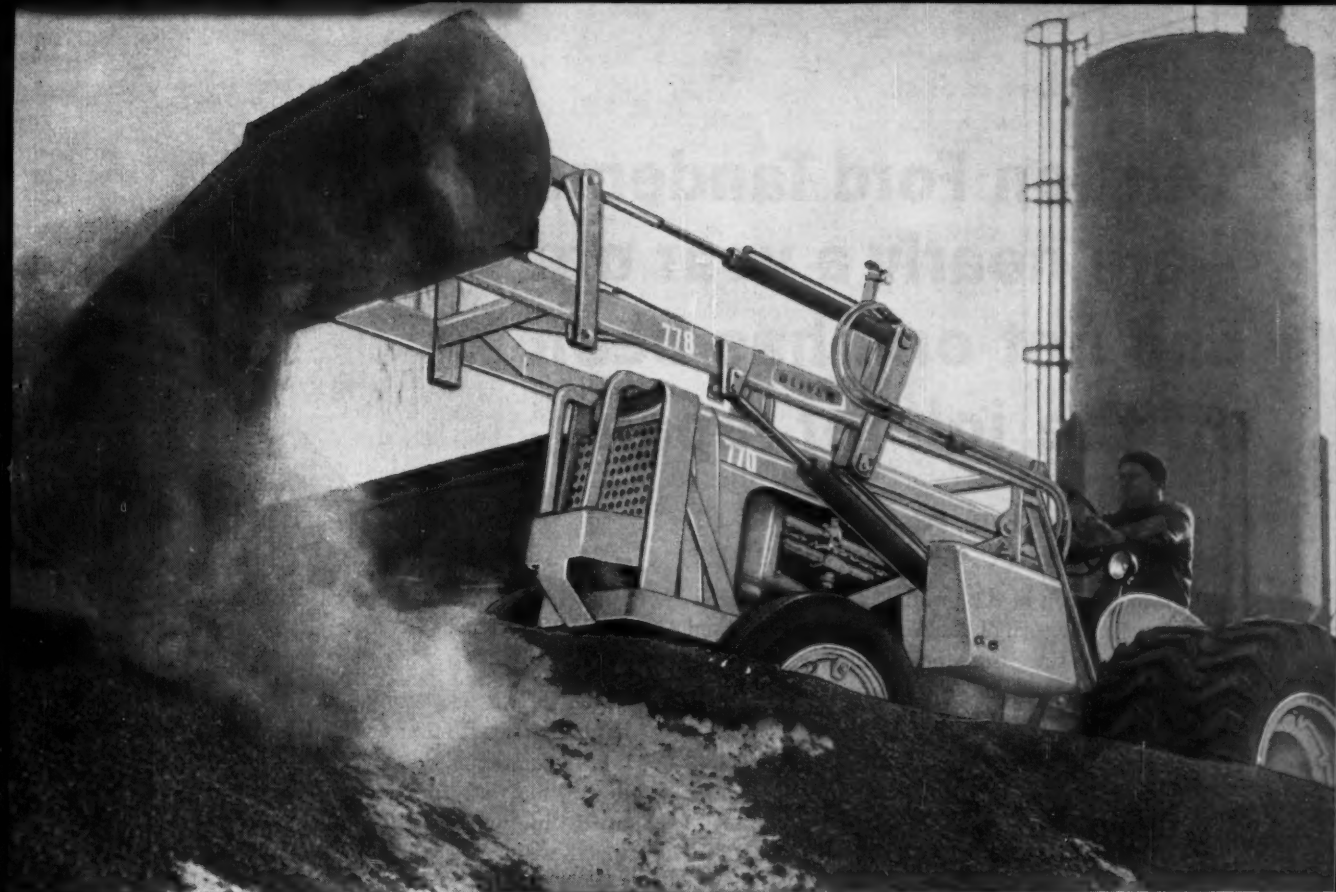
braced by timbers. Concrete crews worked all winter with insulated forms and tarpaulin protection where needed. (Tunnel crews worked all winter, too, behind a tarpaulin covering the portal of the tunnel.)

Ground water was no problem in the ramp section except for one vein of sand. A Moretrench dewatering system with about 14 points successfully dewatered the vein. Now a single 3-in. mud pump keeps the cut dry.

Three cranes handle most of the ramp work. A Link-Belt Speeder 1½-yd dragline does the excavation. A 35-ton P&H truck crane handles forming and pouring with a 1-yd bucket. A Link-Belt truck crane assists with the concrete work. Two truck cranes split the chore of traveling to a nearby railroad to unload heavy equipment for the job.

Construction started in August, 1959 and is expected to be complete in August, 1962.

Perini's Marine Division is doing the work. Irving Huie is project manager, Tom Adair is tunnel superintendent, Marshal Dean is project engineer, and Ralph (Skip) Adams is office engineer. James F. Armstrong is resident engineer for the Massachusetts Turnpike Authority.



It's quick as a flick...

← REVERSE O TORC →

OLIVER

SUPER-SPEED LOADERS

Most advanced of all ¾-yd. loaders! A real production loader, the Oliver 778 cuts time and work schedules to figures no other can match. Fully framed for strength that makes profits year after year. Torque converter automatically adjusts to the load—you get a full bucket every time!

You'll hustle through every job with an Oliver loader—made even faster with "Reverse-O-Torc," the torque converter that saves you time and money. No shifting, no clutching—just flick the lever and you change direction forward or backward instantly. With "Reverse-O-Torc" you'll roll out more work cycles per day and wheel in more profits for yourself!

Speed-test either of these top-production Oliver loaders. Match the tractor and equipment to suit your needs and get the work package that gives you the most earning power for your money.

And check the other models in the all-purpose Oliver wheel line: the handy Oliver 550, compact-sized loader that gets in and digs where others can't go; the big-muscled Oliver Series 900's, most proved high-powered wheel tractors built!



THE OLIVER CORPORATION

Dept. 2232, 400 W. Madison St., Chicago 6, Illinois

LOOK TO OLIVER FOR YOUR BEST BUY IN WHEEL AND CRAWLER TRACTORS



Fastest loader in the 1-yd. class! That's the Oliver 888! Powerful hydraulics provide maximum down pressure and deep penetration. Add "Reverse-O-Torc" and you have an unbeatable money-making combination. Engine torque is multiplied more than twice over—you're always in the right gear ratio for your work.

"Our ten Ford Tandems are nearly a year old and not one has been off the job for repairs"

**SAYS ALBERT HOFFKEN, PRESIDENT
HOEFFKEN BROS., INC., BELLEVILLE, ILLINOIS**

"We have been in the grading and paving business since the turn of the century and have used Ford Trucks since the Model T days. Our experience has proved that Fords are economical to operate and the easiest to keep on the job. All repairing is done in our shop so we can tell which trucks are the best for us.

"Our schedules make it impractical to assign a driver to a particular truck and it's not unusual for one unit to have as many as 20 different drivers. This is one of the big reasons we ordered

Transmatic Drives on our most recent Ford Tandems. These ten T-800's are nearly a year old and not one has been off the job for repairs.

"Ford's '332' V-8 gives us the power and performance we need for efficient batch concrete hauling. Our Tandems with Dumpercrete bodies carry nearly 6 cu. yd. per trip. And, even in mud up to the axles, they get the loads through. Another thing we like about Ford Trucks is the fact that Ford parts are less costly to buy and much easier to obtain than parts of other well-known truck manufacturers."



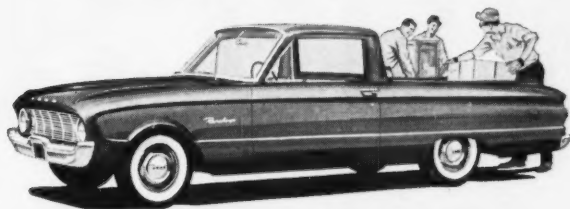
FORD TRUCKS COST LESS

**LESS TO OWN . . . LESS TO RUN . . .
BUILT TO LAST LONGER, TOO!**

Now at your Ford Dealer's

FORD Falcon RANCHERO

America's
lowest-priced*
pickup truck!



The Falcon Ranchero is priced lower than any pickup in America with comparable standard equipment! And that is just the beginning of your savings. Single-unit construction saves on maintenance . . . it's tighter, quieter, with main underbody structural members zinc-coated against rust and corrosion. Front fenders bolt on, cost less to replace. And Ranchero's passenger-car ride and handling ease lessen driver fatigue.

Hoeffken's T-800 Fords, with Dumperrete bodies, are real all-purpose trucks. They can carry up to 14 tons of crushed rock or 5.7 cubic yards of batch concrete.



UP TO 30 MPG!

Totally new for total savings! Ford's new Falcon Ranchero delivers up to 30 miles on a gallon, yet its new 90-hp Six is geared to do a real job! There's lower costs for oil, tires, brakes, replacement parts . . . nearly everything!

BIG 6-FOOT BOX!

Capacity is more than ample for most pickup hauls—nearly 8 feet of load length with tailgate flat. And thanks to the low floor height, loading and unloading is faster, easier!

FEATURES:

1. Up to 30 miles on a single gallon
2. 4,000 miles between oil changes
3. Diamond Lustre Finish needs no waxing
4. Low loading height
5. Instant-lock tailgate opens, closes with a single, one-hand motion
6. Roomy comfort for three adults
7. Styled to capture admiration

*Based on a comparison of latest available manufacturers' suggested retail delivered prices with comparable standard equipment

See the parade of pickups during your
FORD DEALER'S TRADING FAIR

FOR RESULTS LIKE THIS ON YOUR NEXT SHOT...

WHICH EXPLOSIVE?

The Penn-Can Highway near New Milford, Penna., connecting the Pennsylvania Turnpike Northeast Extension with the New York Thruway.
Contractors: D. A. Kessler Construction Company, Mt. Carmel, Penna. and Lycoming Construction Company, Williamsport, Pennsylvania.



Here's really-effective blasting, the kind that gets more payload service out of all your equipment. Look at the breakage . . . it is uniform and thorough. The rock is "fluffed up" into high peaks that will roll it towards the shovel. Such blasting bottoms well too, with no high spots or boom-straining undisplaced rock under the pile.

Which Explosive? In this case, Atlas AN with Giant "75" primers and Rockmaster® millisecond delay caps initiated at the bottom of 6-in. holes was the right combination for the job.

The point is, breakage, displacement and control like this don't just happen. There is a combination of explosives and blasting methods that is right for every shot. Helping you find the right combination and putting it to work is the job of

your Atlas Representative. Working with him, you'll have the advantage of his experience with the latest advances in explosives and techniques. Backed by the complete Atlas line, he can help you determine the explosives combination and the particular blasting methods that will be the most profitable for you on every shot.

There is only one way to look at explosives costs, and that is: which explosive will give you the most payload service from *all* your equipment? Our blasting cost chart, slide rules and technical literature are designed to help you do exactly that. Ask your Atlas Representative about them . . . or, write directly to:

ATLAS POWDER COMPANY
Explosives Division, Wilmington 99, Del.



ATLAS EXPLOSIVES

When you use the
right combination,
all your equipment
moves in sooner...
works faster...
produces more.



ATLAS PELLETS, a new form of ammonium nitrate, have both the density and sensitivity required for efficient ammonium nitrate blasting.



GIANT GELATINS are for high velocity shattering action. They are advantageous for extremes of wet work and for hard, tight shooting.



GIANT "75" PRIMERS have the wallop required for complete, efficient detonation of both field mixed and plant mixed blasting agents.

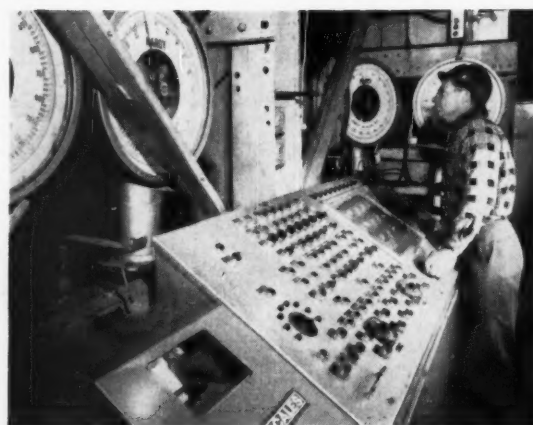


ROCKMASTER® electric blasting caps achieve the staggered action which has been so important in producing better breakage and control.



OLD PLANT—Still in top form after a 40-year career, this mixer boat has produced 58,000 yd of concrete for the New Cumberland Dam on the Ohio River.

NEW CONTROLS—A complex array of electronic equipment added to meet exacting job specs controls the mixing process and records weights of materials.



Latest step in modernizing a 40-year-old mixer boat is the addition of electronic equipment to control batching and meet tighter specs.

Old Mixer Boat Has New Tricks

By F. J. LARKIN
Plant Engineer
Contracting Division
Dravo Corporation

A 40-YEAR-OLD mixer boat belonging to the Dravo Corporation, Pittsburgh, has been modernized with electronic equipment to make it as up-to-date as the latest satellite-launching rockets.

The venerable floating plant has supplied concrete for many construction projects during its lifetime. And its equipment has undergone many changes since it was launched in 1919. At that time it was fitted with a single steam-driven mixer and a tower and chutes to place the concrete. Last change before the present modernization was the installation of two tilting mixers with completely automatic batching back in 1949.

At that time it was considered tops, but standards change rapidly. When Dravo won the contract for construction of New Cumberland Dam, a high-lift navigation

control structure on the Ohio River, they decided it was time for a change. Specifications on the project made it advisable to add three features to the controls of the mixing boat—automatic mix selection, automatic moisture control, and full recording of all batch ingredients.

So a complicated array of electronic equipment was added to improve control of the mixing process and to record the weights of all batch materials.

What happens in the electrical guts of these units is, of course, a complex story; but here's how it works from the operator's viewpoint. The specific mixes are set up, one on each of three rows of potentiometers. The operator selects the desired mix and begins batching simply by pressing a button. The scales measure out the correct amount of each material, and a printer records the information on a tape.

The neatly printed tape provides a complete record of each batch. The code used to decipher

the rows of numbers on the tape is simple. The first line for each mix cycle gives the month, day, and year the batch was mixed, and the code number of the specific mix. The second line gives the time of day. The succeeding lines, all preceded by an identifying letter (A for aggregate, W for water, C for cement), give the weights of each ingredient in the batch.

The system can be set either to recycle to the same mixer on completion of a batch or to operate alternately between the two mixers.

Overall results with the new equipment have been excellent. The rejuvenated mixer boat has produced more than 58,000 yd of concrete for first-stage construction at New Cumberland Dam.

Hardy Scale Co. and their subcontractors, the Monroe Calculating Machine Co. and the Datex Division of G. M. Giannini Co., designed, manufactured, and installed the electronic equipment for Dravo.

*tough job, sure...
but easy for*

Hopto

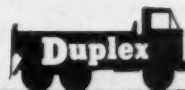
Hopto's powerful digging and prying action pay big dividends on the tough jobs. Full-hydraulic power provides fast, positive control of all digging actions... keeps Hopto on the go in materials that stop bigger excavators. Hopto full-hydraulic excavators are available in a size and type to match your job.

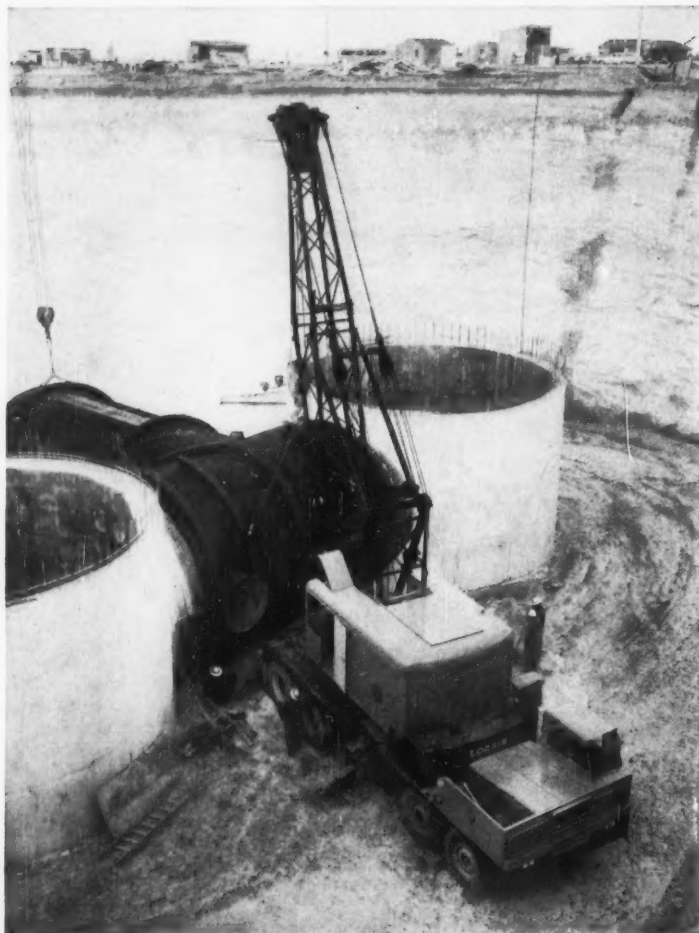


Distributors in over 75 principal cities in the United States and Canada

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WARNER & SWASEY
BADGER DIVISION • WINONA, MINNESOTA





Working on antenna silos 27 ft. in diameter and 65 ft. deep, the MC-760 makes big lifts with precision control. Its rugged carrier with a 230" wheel-base is built by Lorain to withstand the torsional stress of heavy-duty service. "Shear-Ball" Connection keeps swings smooth, reduces maintenance, and is warranted for 10 years.

At nation's first totally underground missile base Lorain Moto-Cranes speed construction

With its Power-Set® Outriggers set for sure stability, this 65-ton Lorain Moto-Crane MC-760 positions 42-ton antenna silo terminal junctions at Lowry Air Force Base near Denver. This is one of two of this model at work here. Morrison-Knudsen Company, Inc. and Associates use the capacity and mobility of Lorain Moto-Cranes in constructing six missile complexes of their \$67.5 million contract.

The MC-760 loses no time as it moves between jobs at each extensive complex. Power-Set Outriggers adjust to the roughest terrain in less than a minute. Move-ups take

even less time. This Moto-Crane travels 5 to 37 miles between complexes at 37 mph. At the job the "760" has the balance, control and capacity to keep output high.

Today's pace setting jobs call for reliable Moto-Crane performance. Lorain dependability is backed by over 40 years' experience in building rubber tire cranes. Progressive contractors know that Moto-Cranes get to the job faster, finish the job quicker.

For details, see your Lorain distributor.

THE THEW SHOVEL COMPANY, LORAIN, OHIO

LORAIN® ON THE MOVE

PLANTS: In Lorain, Elyria and Bucyrus, Ohio . . . **PRODUCTS:** Power shovels, cranes, draglines, clamshells, and hoes on crawlers from $\frac{3}{8}$ - to $2\frac{1}{2}$ -yard capacity • Cranes from 7 to 80 tons . . . on crawlers, and as rubber-tire Moto-Cranes, and Self-Propelled Cranes • Rubber tire front-end Moto-Loaders in 6000-lb. and 7000-lb. carrying capacity . . . **OUTLETS:** Lorain products sold and serviced by 249 distributor outlets throughout the world.

Plastic Balloon Encloses Buildings In Cold Weather

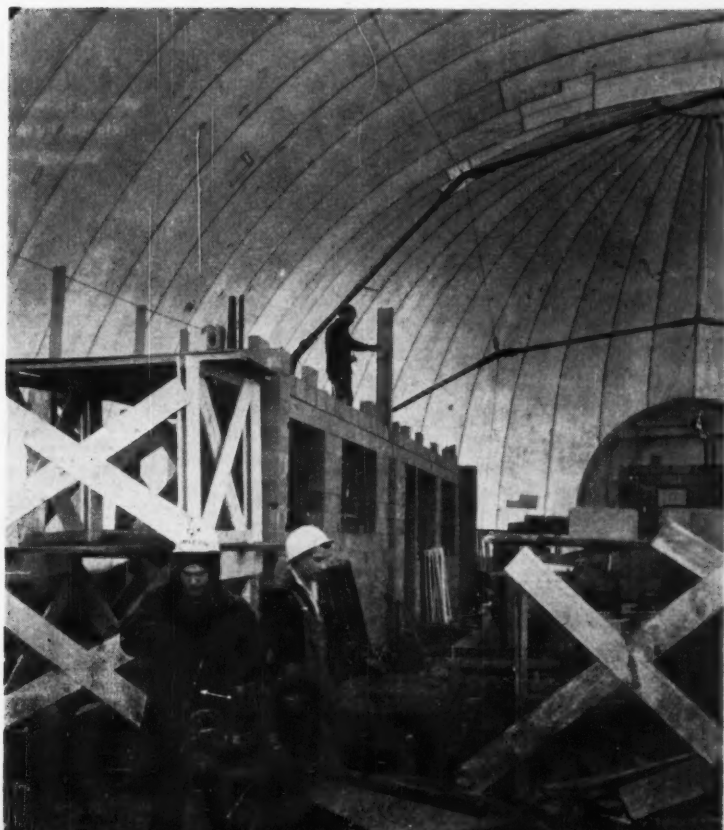
THE CRASH SCHEDULE of top-priority military contracts demands that construction go on without delay through the winter. To keep his crews working on an Air Force installation near Sundance, Wyo., even on the worst winter days, contractor B. H. Baker, Inc., of Colorado Springs, Colo., encloses work areas with a plastic-impregnated nylon balloon.

The balloon cost Baker about \$6,500. They consider it a good investment, especially since it would be almost impossible to build enclosures around some of the five odd-shaped structures they are building. And they fig-



SNOWBOUND—Plastic enclosure looks like giant igloo in this frozen setting.

WORK GOES ON—Building rises within heated interior of 100x60x30-ft balloon.



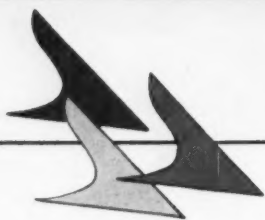
ure they'll get their money's worth with many future reuses.

The inflated balloon measures 100x60x30 ft and includes a 12x12x25-ft air lock for truck entry, and a small personnel lock. A 1½-hp fan supplies air. Pressure is only a few ounces per sq ft, but it holds the balloon so firmly that a man can walk around the top. When deflated the envelope weighs 1,500 lb.

Job superintendent Edwin Copper enthusiastically endorses the plastic balloon, even though it once collapsed and had to be sent back to the factory at Chicago for repairs.

The collapse occurred Christmas Day when the job was shut down. Curious people, attracted by the strange mushroom shape, swarmed around the job site.

continued on page 146



Another example of

3 TYPES
9 MODELS

No matter what your job may be — from small grading work such as land improvement, plant sites or secondary road construction to the big million yard-and-over projects — there's a Euclid scraper of the size and type that matches the job. Each one is ruggedly built for long life in heavy service . . . job proved for big productive capacity . . . and is years-ahead in engineering design with easy service accessibility that cuts downtime.

EUCLID Division of General Motors
Cleveland 17, Ohio

*Plants in Cleveland and Hudson, Ohio
and Lanarkshire, Scotland*

SIX-WHEELERS

12 yds. 

MODEL SS-12 . . . 17 yds. heaped . . . 227 h.p.
... 5-speed transmission . . . 21.00 x 25 drive
and scraper tires, with 24.00 x 25 optional.

18 yds. 

MODEL SS-18 . . . 25 yds. heaped . . . 320 or
336 h.p. . . . Torqmatic Drive or 10-speed
standard transmission . . . 24.00 x 25 tires
standard, 29.5 x 25 optional.

24 yds. 

MODEL SS-24 . . . 32 yds. heaped . . . 360 h.p.
... Torqmatic Drive with converter lock-up . . .
27.00 x 33 tires are standard with 33.5 x 33
optional.

33 yds. 

MODEL SS-33 . . . 43 yds. heaped . . . 432 h.p.
... Torqmatic Drive with converter lock-up . . .
33.5 x 33 tires on drive and 37.5 x 33 on scraper
wheels.

Maximum stability for long, high-speed hauls . . .
scraper bowls are interchangeable with bottom-
dumps of 13, 17, and 30 cu. yd. struck capacities.



EUCLID EQUIPMENT

FOR MOVING EARTH, ROCK, COAL AND ORE

Euclid's Greater Dimension...

MOST MODERN AND COMPLETE LINE OF SCRAPERS IN THE INDUSTRY



ALL-WHEEL DRIVE "TWINS"

Twin-Power for big productive capacity and work-ability... a one-man earthmoving spread that can work more days and lengthen the working season.

14 yds. ➤

MODEL TS-14... 20 yds. heaped... two engines with a total of 296 h.p. ... separate Torqmatic Drive for each axle... 24.00 x 25 tires.

24 yds. ➤

MODEL TS-24... 32 yds. heaped... total of 563 h.p. ... separate Torqmatic Drives for each axle... tires are 27.00 x 33 standard with 33.5 x 33 optional.



OVERHUNG

Excellent maneuverability and ease of handling combined with power and speed that cuts cycle time.

7 yds. ➤

MODEL S-7... 9 yds. heaped... 148 h.p. ... with Torqmatic Drive... full 90° hydraulic steering... 18.00 x 25 tires standard, 21.00 x 25 optional.

12 yds. ➤

MODEL S-12... 17 yds. heaped... 227 h.p. ... 5-speed transmission... full 90° hydraulic steering... 24.00 x 25 tires.

21 yds. ➤

MODEL S-18... 30 yds. heaped... 336 h.p. ... with Torqmatic Drive and converter lock-up... 27.00 x 33 tires standard, 33.5 x 33 optional.

➤ **Get all the facts and see how Euclid's Greater Dimension can bring a better return on your scraper investment.**

PLASTIC BALLOON...continued



AIR INTAKE—A 1½-hp fan supplies air to keep 1,500-lb plastic envelope inflated.



HATCH — Workman enters enclosure through small air lock in side of the balloon.

Someone left the door open and air escaped, deflating the balloon. The wind-whipped fabric caught and ripped on a corner of the masonry building being constructed within.

But Copper blames the accident on the carelessness of the uninvited visitors, not on the balloon. He's well satisfied with its stability. Although guaranteed to withstand winds up to only 50 mph, the plastic enclosure has taken in stride winds of a much higher velocity. "All it does is lean over a little," Copper says.

Despite frequent winds of gale force, the winter was not a real challenge to the balloon in one respect—snowfall was below normal. Most of what snow did fall slid off the smooth curved surface of the balloon. Workmen removed wet snow that stuck to the crown by dragging a rope across the top. They dealt with accumulations of ice by partially deflating the balloon, then blowing it up again, causing the ice to crack and fall off.

Since the collapse of the balloon the contractor has installed a pipe framework braced by cables to support the fabric and prevent rips if it should collapse again.

It cost Baker about \$300 per month to heat the enclosure. Two 250,000-Btu heaters and one 600,000-Btu unit held temperatures inside the tent at the required 40 deg even when the outside reading was as low as 18 deg below zero. The translucent surface of the balloon admits considerable solar heat. Occasionally on sunny days workmen go around in their shirt sleeves, and the heaters can be turned down to supply only a minimum of heat.

Moving the balloon from one structure to another became routine to the Baker crew after a little experience manhandling the heavy envelope. It takes a four-man crew just one day to remove the balloon and set it up, inflated, over another structure. The crew soon became adept at using the fan to manipulate the balloon, floating it into place on the entrapped air.

Superintendent Copper says the tent has this one drawback. Storage space around the sides of the enclosure is limited. A load of sand dumped inside by a truck, for example, must be rehandled to distribute it in small piles to where workmen need it. It makes materials handling expensive.

STARTED WITH
1
PRIME-MOVER

NOW
OWNS
23
PRIME-MOVERS

THE
SELZER-ORNST CO.
MILWAUKEE

provides its laborers with the power to produce. PRIME-MOVER is made specifically for laborers' use—to triple their output in handling of materials. Here is an immediate and positive way to cut costs. Why not do as this alert contractor is doing? Give your laborers the power to produce. Write for job estimating data and performance reports.

A PRIME-MOVER places from 12 to 17 cubic yards per hour on the average pour.



THE PRIME-MOVER CO.
PRIME-MOVER
MUSCATINE, IOWA



SUPERIOR DESIGN & PERFORMANCE ... CURTISS-WRIGHT EARTHMOVERS

Curtiss-Wright scrapers not only give you outstanding productive capacity, but also design superiority in every small detail. Ease of control, reduced operator fatigue, improved riding and handling characteristics, and many other less obvious details so important to maximum daily production are given full consideration in every C-W unit . . . insuring superiority in every phase of scraper design, construction and performance.

SOUTH BEND DIVISION
CURTISS-WRIGHT CORPORATION
SOUTH BEND, INDIANA

Distributed in Canada by Canadian Curtiss-Wright Ltd.

TURN PAGE

ESTIMATING EARTHMOVING COSTS

There are several different ways of estimating earthmoving production. There is the wild guess (this has bankrupted many), the educated guess (this depends entirely on the experience of the guesser), and the arithmetical calculation tempered with good judgment.

The latter is the most reliable means of job estimating. It consists of analyzing each segment of the job and arriving at a total required time per unit to move the total yardage.

For example: A job has 3,000,000 cu. yds. of excavation. A particular cut contains 236,000 yds. that can go into one fill with an average haul of 3500 ft. The material is sandy clay with good loading characteristics and a bank weight of 2800 # per yard. The contractor owns four available CW-226's. The haul will be over the new road bed, compacted, well maintained, with a 3% favorable grade, loaded, and an estimated rolling resistance of 70 # per ton. In this type of material, the CW-226 averages a 1.12 bowl factor. Cycle time is figured as follows:

Weight empty	=	85,500 #	=	42.75 tons
Load 26 x 1.12 x 2800	=	81,536 #	=	40.75 tons
Gross Weight	=	167,036 #	=	83.5 tons
Rolling Resistance Empty	=	70 #/ton x 42.75 tons	=	2,933 #
Grade Resistance Empty	=	20 x 3% x 42.75 tons	=	+2,565 #
				5,558 #
Rolling Resistance loaded	=	70 #/ton x 83.5 tons	=	5,845 #
Grade Assistance loaded	=	20 x 3% x 83.5 tons	=	-5,010 #
				835 #

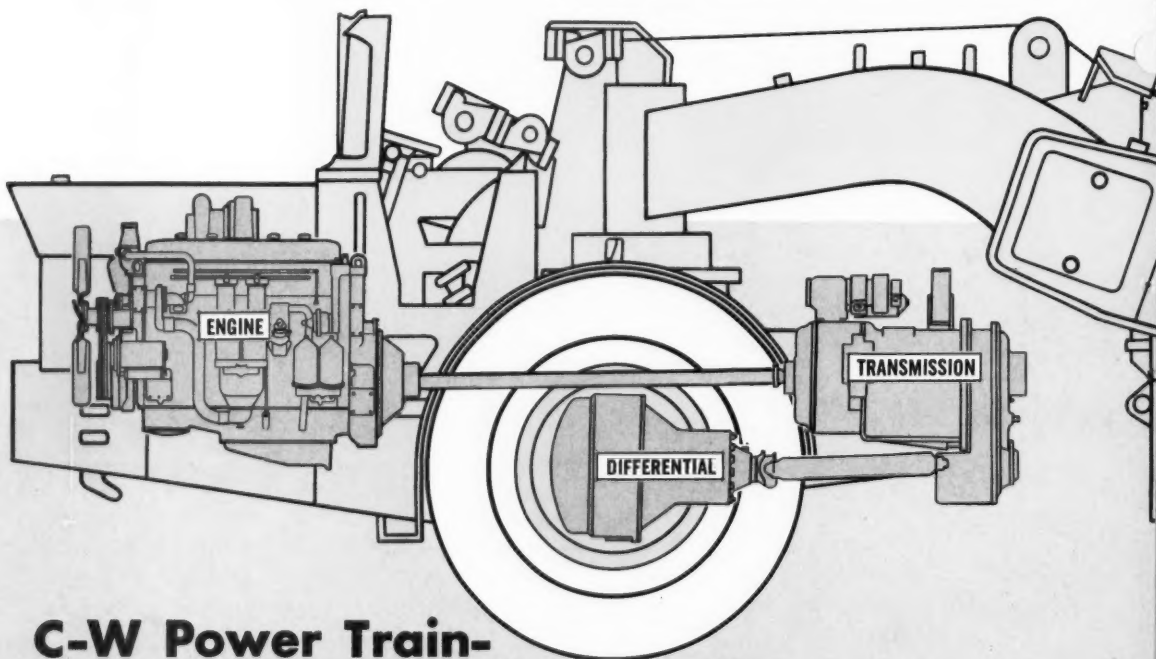
Spot in cut and wait for pusher	.5 min.
Load	.8 min.
Accelerate	.3 min.

Travel 3500' 4th gear 30 mph	3500	1.3 min.
Dump and turn	30 x 88	.5 min.
Accelerate		.3 min.

Return 3500' 3rd gear 16 mph	3500	2.5 min.
	16 x 88	6.2 min.

Based on a 50 minute hour (83% efficiency) each unit will make 8 trips per hour $\frac{(50)}{(6.2)}$, hauling 26 x 1.12 or 29.1 pay yards each trip. Hourly production is then 233 pay yards. The CW-226 has an estimated hourly ownership and operating cost of \$25.30 per hour. Cost per yard would be $\frac{25.30}{233}$ or 10.8¢ per yard. With four units being used, each should bear $\frac{1}{4}$ of the cost of the pushers, grader and water truck. Based on a 10 hour shift, the four units would produce 9320 cu. yds. per shift and would work the cut in 25.4 shifts.

Going back to the calculation of cycle time, it should be explained that we are figuring on a tightly-run job with top operators on all units. If such is not the case, the use of two push-tractors should be considered. Loading time is based on the size of the hauling units, size of the push-tractor and loading characteristics of the material. The acceleration figure is a case of mathematics and judgment. Rimpull charts for the CW-226 show 4140 # in 3rd gear lockup and 2780 # in 4th gear lockup. Previous calculations showed that due to grade assistance only 835 # is required to move the load. Therefore, there is excess rimpull equal to 39 # per gross ton in 3rd gear lockup and 23 # per gross ton in 4th gear lockup. This is a very favorable excess and will result in rapid acceleration. One mph equals 88 ft. per minute, therefore, the travel time formula is $\frac{\text{DISTANCE IN FT.}}{\text{SPEED IN MPH} \times 88}$ with the answer in minutes. Dump and turn time is determined by job conditions. This material will dump quickly and spread evenly for a solid haul road. The acceleration on return is based on the fact that although the unit is empty it has a grade resistance of 2535 # in addition to the rolling resistance and therefore will at best be travelling in 3rd gear, convertor stage. Return travel time is figured in the same manner as travel time, loaded. Basing your calculations on the standard 50 minute hour, you should arrive at an accurate estimate of job time and costs.



C-W Power Train- High Performance with Easy Service



FREE . . . An attractive binder for the complete C-W Job Information series is available from your Curtiss-Wright distributor. Ask for it!

From the engine right through the power train, every unit is easily accessible. The engine is easily serviced with the hood raised. With the scraper jack-knifed, the transmission is as easily worked on as if it were on your shop bench. By disconnecting one drive shaft, blocking the tractor and removing the mounting bolts, the entire wheel and axle assembly can be rolled out. This convenience and service accessibility assures C-W owners of minimum downtime for any power train servicing job.



"The finest hoist I ever operated"

Ask the operator on any job why he likes his Clyde and he'll tell you feature by feature.

Maybe the internally expanding band friction clutch, its extremely easy and smooth engagement and release and the elimination of shock loads is a feature he appreciates most. Or the fact that he need only 'toe' the extra heavy duty, large diameter brake for safe, sure and accurate load control.

No doubt he will tell you about some of the many other features he likes . . . anti-friction bearings throughout that result in greater line pull with less power . . . low cost maintenance as well as low operating costs . . . correct diameter, semi-steel drums that afford smooth and rapid free spooling.

Clyde operators and owners too, are Clyde's best hoist salesmen . . . the finest compliment that can be paid to the modern engineering and precision manufacture of the Clyde line of finest quality material handling equipment.

For the complete story on the advantages of Clyde's design, write for Bulletin 34A.

This 15-story parking garage in St. Louis is but one of the many jobs on which this Clyde Hoist has helped to maintain or even better construction schedules. ➡



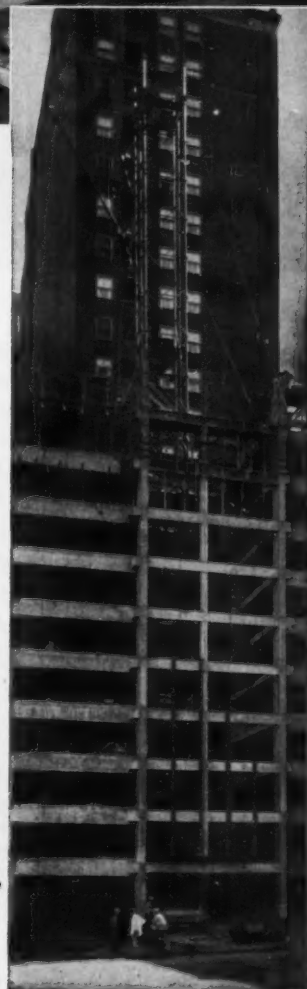
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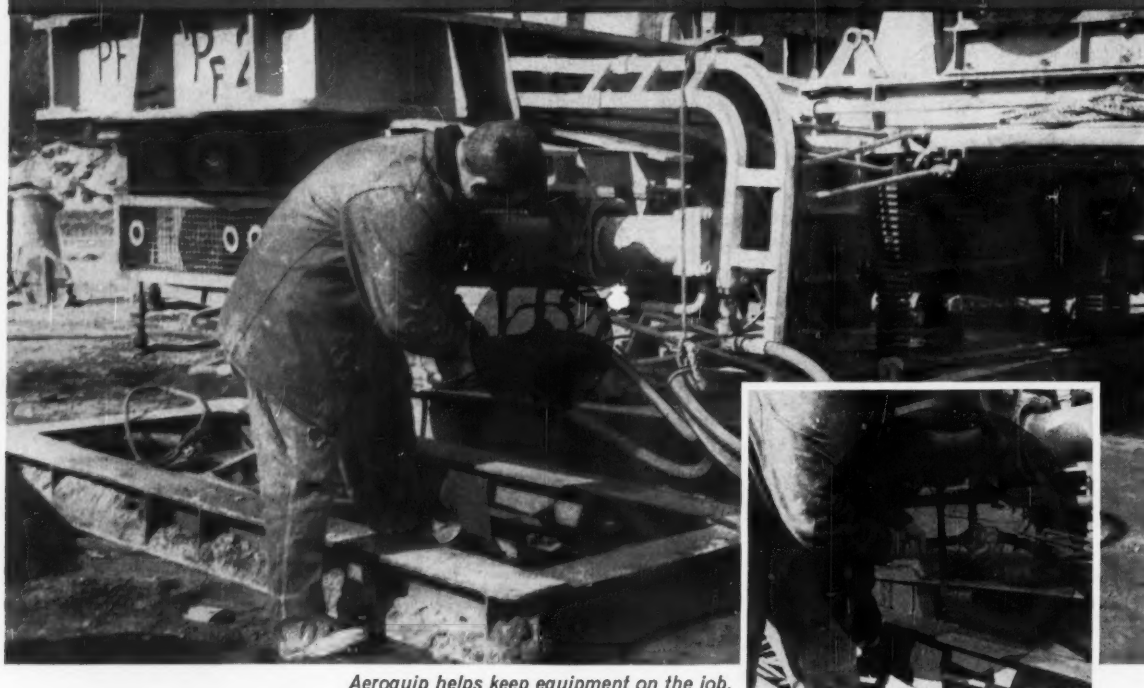
Established 1899
DULUTH 1, MINNESOTA

HOISTS : DERRICKS : WHIRLEYS : UNLOADERS
BUILDERS TOWERS : CAR PULLERS : ROLLERS



walking pile driver has up to 8000 psi peak hydraulic pressures handled by Aeroquip Very High Pressure Hose

...from job report, Franki Foundation Co., Boston, Mass.



Aeroquip helps keep equipment on the job.

Hydraulic pressure is the key to walking Franki's 70-ton rig onto a foundation job. Frequently, the hydraulic pressure hits 7000 to 8000 psi—only the best hose can take this kind of punishment. Aeroquip 1508 Spiral Wrap Reinforced Hose is meeting this extreme test without break or trace of leak. The pictures show a Franki rig on one of the 140 caissons required for a new department store at the New England Shopping Center, Saugus, Mass. Franki is also using Aeroquip Low Pressure

Hose for air lines on his construction equipment.

Our files of job reports like this show you are in good hands when you consult with Aeroquip. You'll find details about the right kind of Aeroquip Hose and Reusable Fittings for your particular applications in Catalog 204. Your Aeroquip distributor, a fluid line specialist, will give you a copy. He'll discuss, without obligation, various applications that might be helpful to you. His number is in the "Yellow Pages" under "Hose."



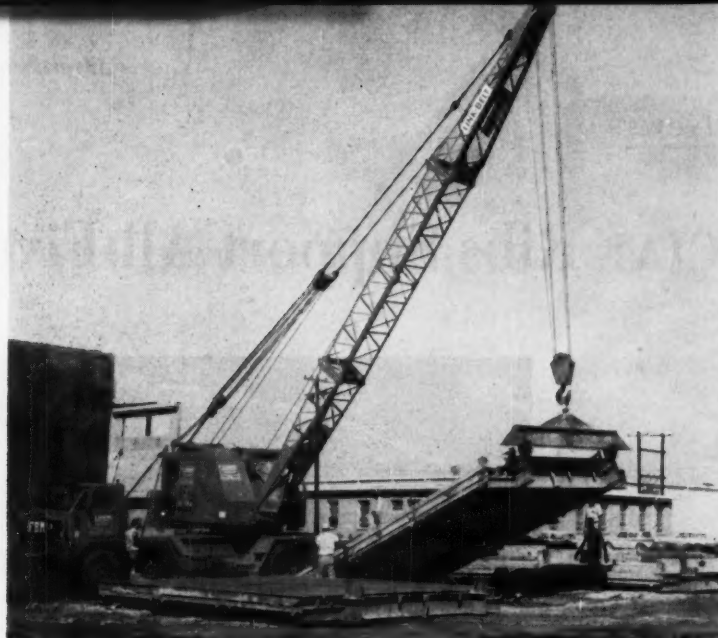
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INDUSTRIAL DIVISION, VAN WERT, OHIO • WESTERN DIVISION, BURBANK, CALIFORNIA
AEROQUIP (CANADA) LTD., TORONTO 19, ONTARIO

AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN CANADA, U.S.A., AND ABROAD



Aeroquip is so easy to use—inventor's just a few feet of hose and a handful of fittings.



TILTING UP WALL PANELS—Truck crane with lift line hooked onto spreader bar attached to frame lifts 16x23-ft wall panel into place for 69,000-sq ft grain storage building.



REMOVING FRAMES—Crane strips frame immediately after placing precast wall panel.

Frame Holds Tilt-Up Slabs

IT'S NO TIME AT ALL before the walls of a building are up when the contractor pours precast concrete wall panels one day and tilts them up into place the next day. That's the system Garmon Construction Co. of Fort Worth, Tex., uses to shave as much as \$1 per sq ft from construction costs, saving up to 6 days in erection time.

The secret is a simple steel frame that serves both as a form for casting the wall panels and as a support that holds them during erection. The frame prevents buckling or warping of the green concrete in the panel while it is being tilted up into place. It's stripped immediately and made ready for another pour. Curing is completed after the panel has been set up. With the frames, Garmon can cast wall panels as large as 16x27 ft.

Since developing the system 4½ yr ago, Garmon has used it to advantage in constructing some 700,000 sq ft of buildings in the Dallas-Fort Worth area. They are now offering franchises permitting other builders to use the patented process, called Tilt-Frame. A recently completed 69,000-sq-ft grain storage building in Fort Worth illustrates the method.

Garmon used eight frames, together with companion column forms and other accessories on this job. The first day they poured and finished eight panels, each measuring 16x23 ft and requiring about 7 yd of 3,000-psi concrete. No additives were used in the mix. They completed casting the eight panels by noon and allowed them to set until the following morning.

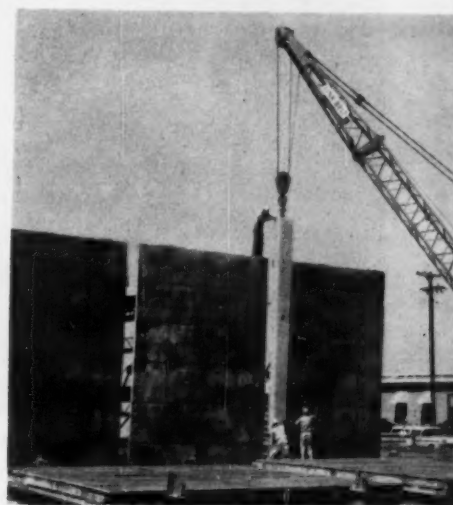
Then a truck crane positioned the panels, hooking onto a spreader bar attached in turn to each frame. The frames took all the weight of the 17-ton panels during the tilting up process. Slanting pipe rakers attached to the inside of the placed panels braced them after removal of the frame.

The crew completed erection of the panels by noon, leaving plenty of time for pouring eight more panels in the frames that afternoon. In this way, erecting and pouring eight panels a day, Garmon completed the walls of the building in just 8 days. This included precasting and setting concrete columns that fit between the wall panels.

The method eliminates the need for grade beams. The floor can be saved for last, and need not be a concrete slab. In this case Garmon put the roof on the build-

ing after placing the wall panels and columns on their concrete piers. The floors went in last.

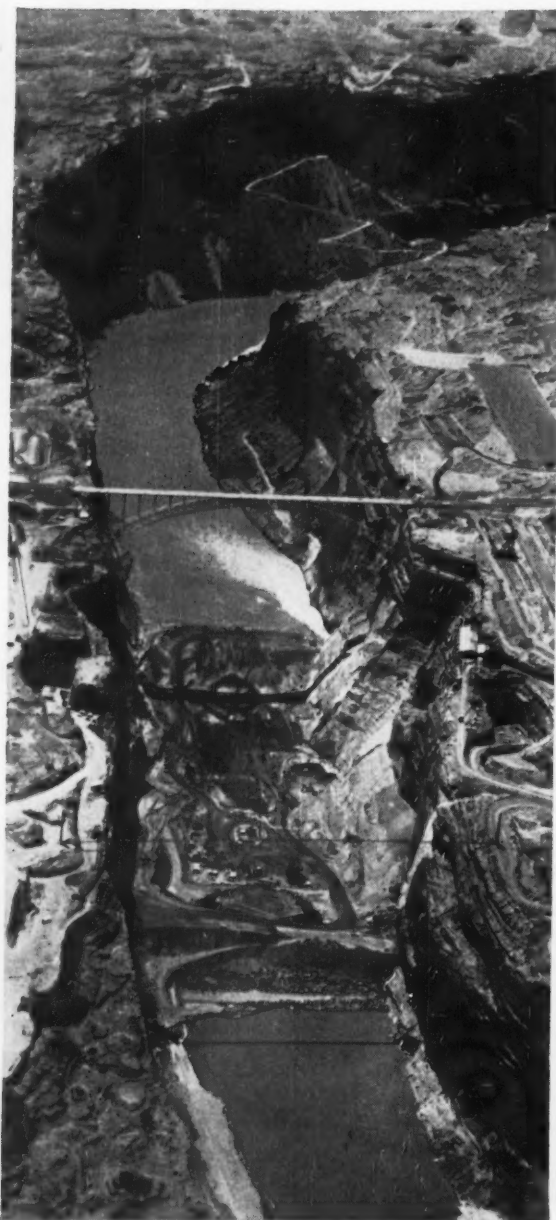
Cost of this particular building was only \$3 per sq ft, but, as Garmon points out, this figure will vary widely depending on the number of door and window openings cast into the panels.



PLACING COLUMNS — Precast column sections go into place on their concrete piers after wall panels are tilted up. Roof goes on after walls. Floor slab goes in last.

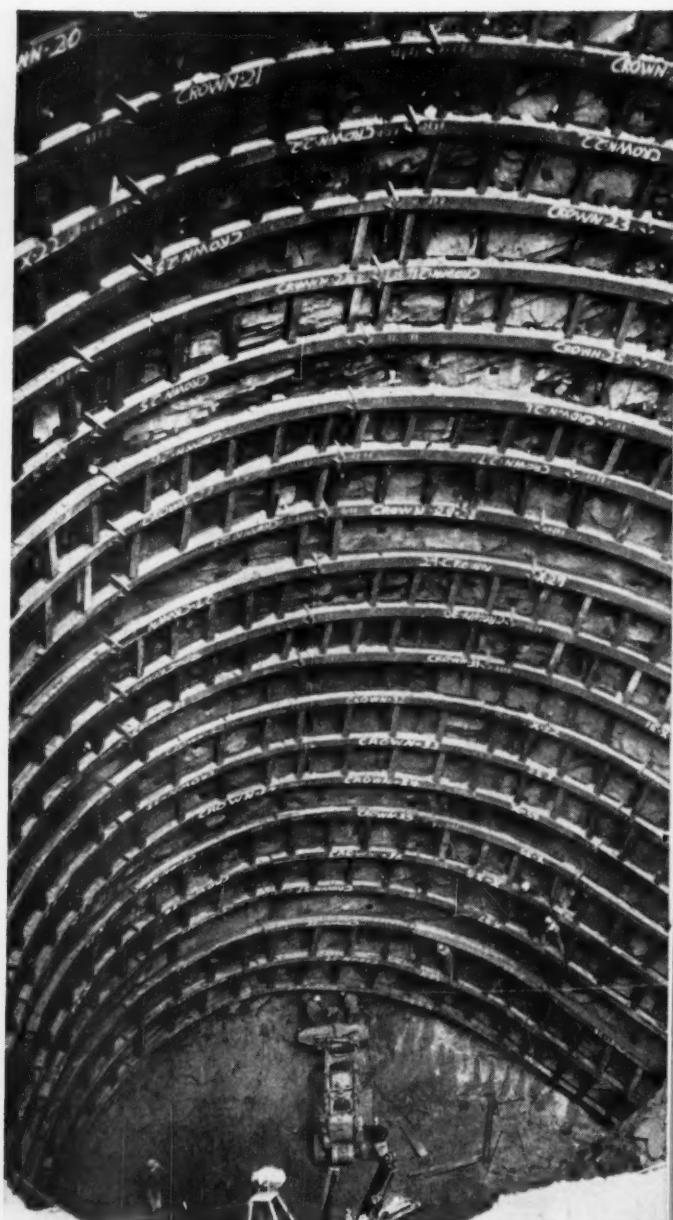
New Construction Idea News

How COMMERCIAL Ribs Support All Five



U. S. BUREAU OF RECLAMATION PHOTO FROM UPI

COLORADO RIVER DISAPPEARS as flow is diverted through tunnel in west canyon wall where dam will soon start to rise in the 700 ft. gorge of the Colorado River. Glen Canyon Dam is a \$325,000,000 Bureau of Reclamation project including a 900,000 kw hydroelectric power plant. It will create an upstream reservoir 186 miles long to infuse vigor and productivity into arid wasteland.



WIDEST BORE EVER SUPPORTED with steel required heaviest tunnel ribs ever bent in quantity. Portals of spillway tunnels are 113 ft. wide, over 80 ft. high at crown. Bore gradually changes to circular 63 ft. diameter. COMMERCIAL engineered and produced all ribs...design involved solving of ever-changing curves...fabrication included multi-curvature bending of 14" WF beams @ 167#/ft. for roof support at transition and 12" WF beams @ 72#/ft. for circular section. Solved was one of the most difficult tunnel support jobs ever undertaken.

Glen Canyon Tunnels

Glen Canyon Dam—Merritt-Chapman & Scott Corp., Prime Contractor

Access Tunnel—Frazier-Davis Construction Co., and Gibson-Roberts Construction Co., Tunnel Contractors

Left Spillway Tunnel—Frazier-Davis Construction Co., Tunnel Contractor

Right Spillway Tunnel—Northwood, Inc., Tunnel Contractor

Left Diversion Tunnel—Frazier-Davis Construction Co., Tunnel Contractor

Right Diversion Tunnel—Mountain States Construction Co., Prime Contractor

COMMERCIAL steel ribs and posts—unanimous choice of the four tunnel contractors—provide support for access, diversion and spillway tunnels for Glen Canyon Dam project...scheduled completion 1964.

Working with the Bureau of Reclamation, COMMERCIAL designed and fabricated steel sets which proved to be the solution for supporting these rock tunnels. All were of unusual size, length and roof profile and were constructed under difficult working conditions.

In general: Working conditions in all five tunnels demanded that complete support units be accurately fabricated for easy, fast field erection. The two diversion tunnels, two spillway tunnels and the access tunnel totaled close to 17,000 ft. of tunnel. Delivery schedules were timed to tie in with job progress target dates in the tunnel headings.

In particular: COMMERCIAL solved the extremely difficult task of supporting the multi-profiled transition sections of the spillway tunnels. The problem of size was complicated by the changing elevation and shape of the transitions. At the portal the section was the rectangle of the open cut surmounted by the arch of the tunnel roof. This shape varied continuously toward the smaller and circular cross section of the tunnel to which the transition joins. In addition, the elevation of the roof, spring and flow lines was ever-changing throughout this section and each line's elevation was different. COMMERCIAL had to design supports to fit three exponential curves—each a different formula.

Complete details of COMMERCIAL's contribution in supporting the spillway tunnels for this U. S. Bureau of Reclamation project are available to you. If you have a challenge involving support for a shaft, surface or sub-surface tunnel—hard or soft ground—engineering counsel, based on more than 30 years of experience, is yours for the asking. Address: Commercial Shearing & Stamping Company, Dept. B-19, Youngstown 1, Ohio.



11,000 FT.—8% GRADE ROADWAY—all in tunnel in the canyon wall with tunnel windows every 1,000 ft.—leads to base of dam and will provide access to future powerhouse. Bore: over 20 ft. wide, 22½ ft. high arched roof. Supports: 4-piece rib and post sets, 8" WF beams @ 31#/ft. set on 4 ft. centers.



TWO DIVERSION TUNNELS each over half mile long, aided by cofferdams, sidetrack the Colorado to allow dam construction. Downstream sections later will be joined with plunging spillway tunnels to handle flash flood overflow. Arch: 21' 10" above and 43' 2" wide at spring line. Finished concrete lining: 41' diameter. Steel supports: 6-piece sets spaced on 4 ft. centers. Ribs and posts: 10" WF @ 45#/ft. supported on double 8" I @ 18.4#/ft. wall beams.



SUBGRADE TREATING—Contractor-designed, mobile pugmill mixer picks up subgrade materials, mixes them with water, and deposits the mix in two windrows.

Old Machine Parts Make New Mixing Rig

A PUGMILL MIXER for preparing cement-treated subgrade materials is a self-propelled unit built in the shops of a California contractor from parts salvaged from various construction machines.

On the job, subgrade materials and cement are first deposited in one large windrow in the center of the road. Then the machine picks up the windrow, mixes it with water from a tank truck, and deposits the processed materials in two windrows for spreading.

Big capacity was the primary goal in developing this rig. T. I. Gibson, manager of maintenance and repairs at the Griffith Co. of Los Angeles, developed the machine. He says his rig can handle more than 4 cu yd per min and can operate at speeds from 9 to 30 fpm. On a highway paving job it processed enough material in one pass for a 4-in.-deep 26-ft-wide course.

The chassis for the mobile mixer is about 11 ft wide and 25 ft

long and is mounted on three axles riding on rubber tires. The front axle comes from a Maxi self-propelled crane carrier; the rear axles were salvaged from Mack dump trucks.

At the front of the machine, a bucket elevator picks up the windrowed materials and discharges them on an enclosed belt conveyor that feeds the pugmill mixer. The elevator consists of 10x42-in. buckets that were made to order for the Griffith Co. The overhead conveyor belt is 42 in. wide and 11 ft long.

The pugmill mixer is a double-shafted unit that was built in Griffith's shop. The mixer is 7 ft wide and 10 ft long; it is built of rolled steel plate and is similar to mixers on asphalt plants. The twin tubular mixer shafts rotate at 78 rpm.

Two diesel engines supply power to the machine. An HBI Cummins engine powers the bucket elevator and propels the rig along the road. An International TD-24 tractor engine drives the

Parts salvaged from old machines make up a high-capacity mobile mixing rig that lifts materials off grade during processing to meet tight California specs.

enclosed belt conveyor and powers the mixer.

After mixing, the processed subgrade materials drop back onto the grade. An inverted V-type chute at the rear of the Griffith mixer deposits the material in two windrows to make it easier to spread.

This machine was first used on a paving job in a Navy airbase at Lemoore, Calif. It was accepted after one day's operation. After completing this job, it was sent to a highway paving job near Fresno. Here the specs called for a 4-in.-deep treatment 26 ft wide. Griffith's mixer filled the bill because California specs require that materials be lifted off the grade at some point of the mixing operation. This makes it easier for state inspectors to check for the proper depth of mixing.

On the Fresno job, the machine was handy because materials were hauled in from other locations and could be unloaded in a windrow. An oversize, shop-built spreader box followed by a cement spreader handled this operation.

After the mixer processed the material, three motor graders handled the final spreading. Two Browning pneumatic rollers and one Buffalo-Springfield 12-ton steel roller took care of the compaction.



BUCKET ELEVATOR—Extra-wide buckets were necessary to make up a materials elevator for picking up large windrows of subgrade materials in front of the rig.

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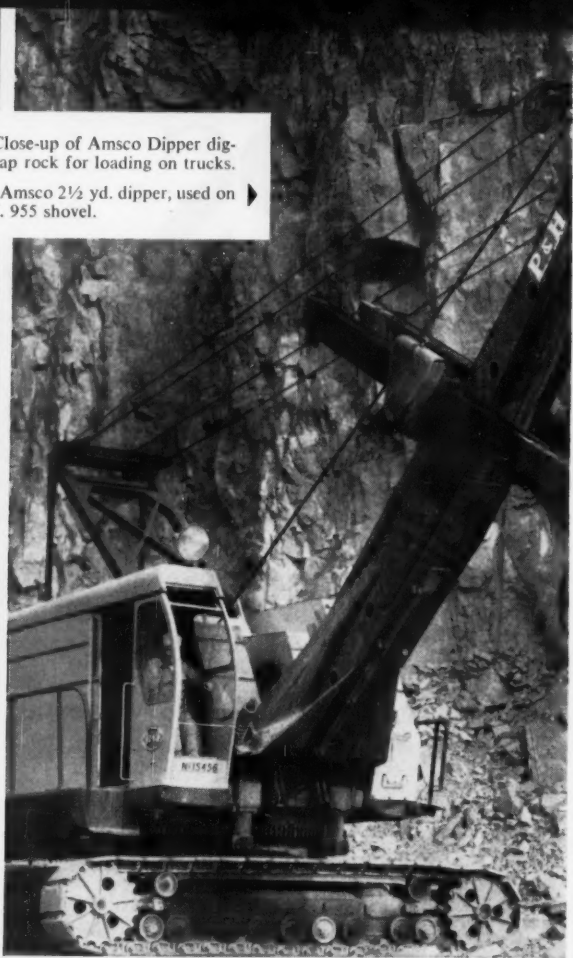
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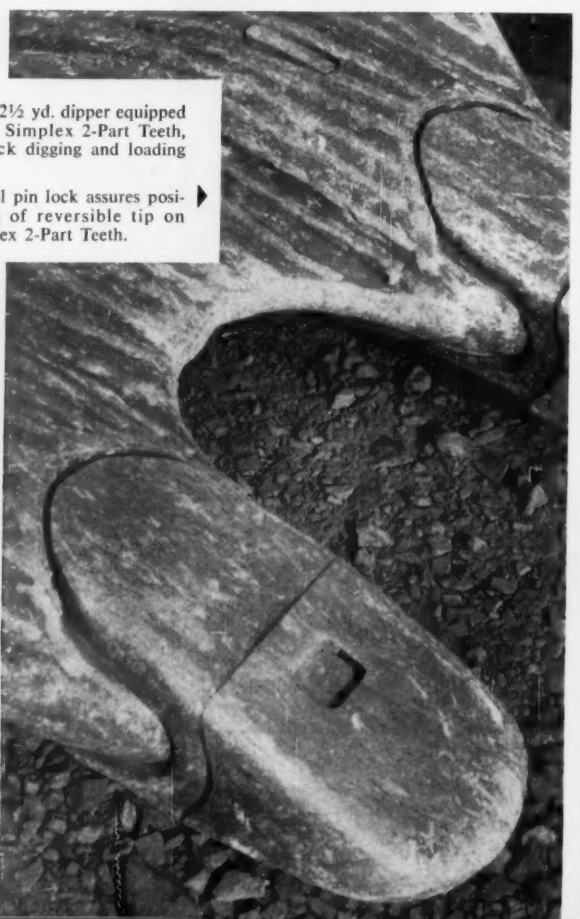
API Service Classification
DS




◀ Left: Close-up of Amsco Dipper digging trap rock for loading on trucks.
 Right: Amsco 2½ yd. dipper, used on P. & H. 955 shovel.



◀ Left: Amsco 2½ yd. dipper equipped with Amsco Simplex 2-Part Teeth, used for rock digging and loading at quarry.
 Right: Special pin lock assures positive locking of reversible tip on Amsco Simplex 2-Part Teeth.





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*Read about the actual
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"WE HAVEN'T WORN OUT AN AMSCO DIPPER IN 5 YEARS"

This, in the words of the quarry superintendent, sums up his experience with Amsco Manganese Steel Dippers. It's rugged work, all in rock, as you see from the pictures at the left. Shovel and dipper are used to load trap rock onto trucks for

transportation to the crushing plant.

The Amsco Dipper was installed because the superintendent had used them before, and knew their reputation for long life under tough digging conditions. Experience is proving him right . . . again.

SIMPLEX TEETH HANDLE 25,000 YDS. OF ROCK BEFORE REPLACEMENT

At this same quarry, Amsco Simplex 2-Part Teeth are giving 120 hours' service . . . handling 25,000 to 30,000 yards of rock . . . before replacement is necessary. That's considerably longer service than has been obtained from competitive 2-part teeth, the quarry superintendent states.

Not only is the wear-life of these

teeth exceptional, but operators like the ease of replacement, and the fact that the tips stay on without trouble.

For further information on Amsco Dippers or Simplex 2-Part Teeth, see your power shovel equipment dealer, or write to Amsco for technical bulletins showing sizes, types and application data. *Patent No. 2,904,968.

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THE STORY BEHIND THIS SEAL

This is more than just the Seal of Approval of the Steel Joist Institute. It is the symbol of a 32-year-old dedication to the welfare and progress of an important segment of the design and construction industries.

What is the Steel Joist Institute?

It is a voluntary association, organized in 1928, of open web steel joist manufacturers. Membership is available to any producer of open web steel joists who elects to manufacture joists in accordance with the standards and practices as adopted by the Institute.

What is its purpose?

The Steel Joist Institute is a nonprofit organization made up of manufacturers actively engaged in the fabrication and distribution of open web steel joists. It was organized to place the industry on a sound engineering basis. Its objectives are to establish methods of design and construction for open web steel joists, to provide test and research data for public dissemination, to assist in the development of appropriate building code regulations, and to publish information relative to the proper

use of steel joists in the interest of safety and the public welfare.

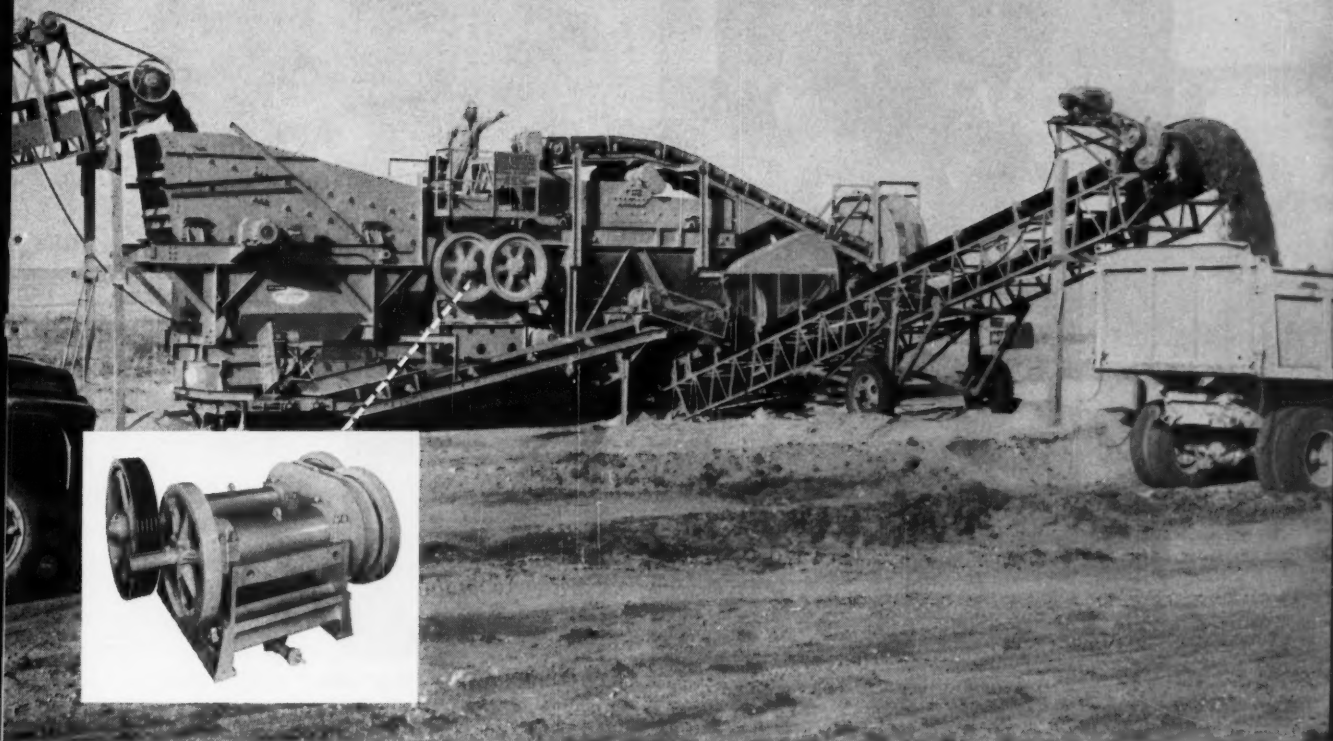
What are its accomplishments?

The Institute has made substantial practical contributions to the building construction industry. It has developed and published a comprehensive manual of standard specifications, load tables, and technical bulletins to assist the architect, engineer, and contractor; conducted research and testing of open web steel joists, bridging and cantilever members; initiated a thorough, effective quality verification program for "S" Series joists and a recommended Code of Standard Practice applicable to steel joists.

Inquiries concerning the Steel Joist Institute should be sent to the Managing Director, Steel Joist Institute.

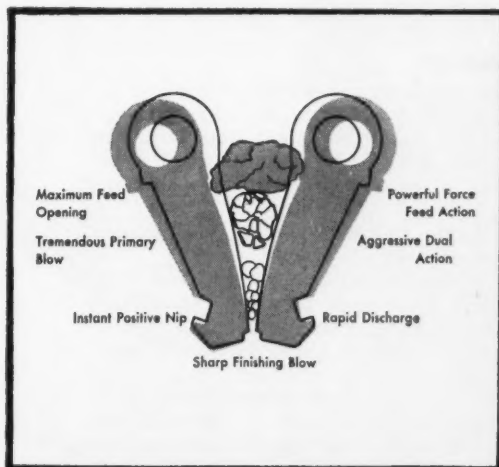
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New Matched Jaw Crusher with its longer jaws gives positive nip without belching. The high speed velocity crushing of two moving jaws provides forced feed and forced discharge. As a result you get primary crushing capacities never before thought possible.

Reduces recirculating loads. The Matched Jaws' dual crushing action with its tremendous pri-

mary blow plus sharp finishing blow assures close to finished size crushing of discharged material. This reduces recirculating loads and takes the strain off secondary equipment.

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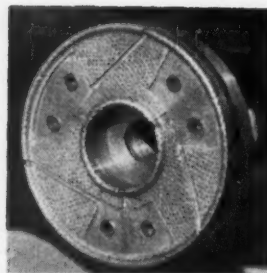
625 C Avenue N.W., Cedar Rapids, Iowa

Subsidiary of Pettibone Mulliken Corporation, 4700 W. Division Street, Chicago 51, Illinois



DRILL RIG — Diamond bit cores a hole in portland cement concrete runway for installation of pancake lights at Atlantic City airfield of Federal Aviation Agency.

How to Set



CUTTING HEAD — For drilling 6-in.-dia holes in asphaltic concrete part of runway, this experimental diamond bit is used.



A BRAND-NEW MARKET for construction contractors is certain to evolve from the development of practical "pancake" lights for airport runways. They can be installed cheaply and quickly in existing pavements of any type, in any desired pattern.

All the contractor needs are: (1) the light units; (2) a small portable diamond-drill rig; (3) a pavement saw; and (4) equipment for sealing the lights and wire raceways with epoxy resin.

The lights were developed after many years of experimentation by L. C. Vipond, lighting engineer for the Federal Aviation Agency, and are not patented. However, New York City's Structural Concrete Products Co. has made the only ones installed so far.

Units are 6 in. in dia and about 2 in. thick. Made of cast steel, they contain a tiny quartz bulb of either 10, 25, or 45-watt size. Deflectors cast into the top of the pancake unit direct the light along the guide path the airport operator wishes to mark. A screw-attached guard over the lamp projects less than 1/2 in. above the pavement surface.

Installing Lights

First large-scale installation of the new lights was made during the past winter at FAA's experimental airport near Atlantic City. There, Pleasantville (N.J.) Contractor Ole Hansen & Sons, Inc., put 1,100 of them in both bituminous and portland cement concrete runway pavements.

First step was to cut holes for the lights, 6 in. in dia and slightly less than 2 in. deep. For this, Hansen mounted a Wheel Trueing Tool Co. gaso-

line-engine-driven core drill on the rear of a truck. A large tank on the truck held water that flushed and cooled a Truco diamond bit that did the cutting. To minimize vibration caused by the long shaft that connected drill bit and arbor, the bit was collared by a plywood templet. After drilling, the center core was chiseled out to complete the hole.

Sawing Raceways

Meanwhile, raceways for electric wiring to the lights were cut in the pavement. A Clipper concrete saw handled this operation. It cut slots 1 in. deep and 1/4 in. wide, and at each light it sawed an enlarged groove to act as a junction box for wiring connections.

Then the lights and wiring were installed and sealed with epoxy resin.

The units have survived a rough winter season—including bouts with snow plows, a plane crash, and, of course, repeated plane landings. Six of the 1,100 lights were damaged, but none beyond repair.

FAA engineers see these lights as a major breakthrough that will permit all airports with paved runways—regardless of size, age, or pavement material—to install modern lighting for night and bad-weather landings.

One of the prime advantages of the pancake lights is their low cost of installation. The Atlantic City operation indicates it to be approximately \$100 per unit. This compares with about \$500 for semi-flush lights and over \$2,700 for the Dutch-patented El-faka lights that are housed in chambers sunk in the pavement.

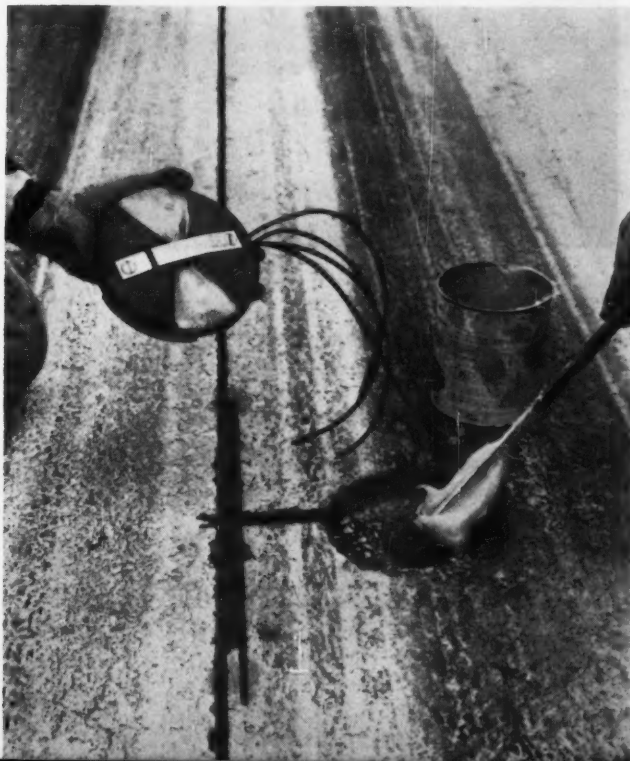
New Lights in Old Runways



READY HOLES — After drilling and removal of cores, holes are ready for pancake lights to be set. At right is un-cored hole.

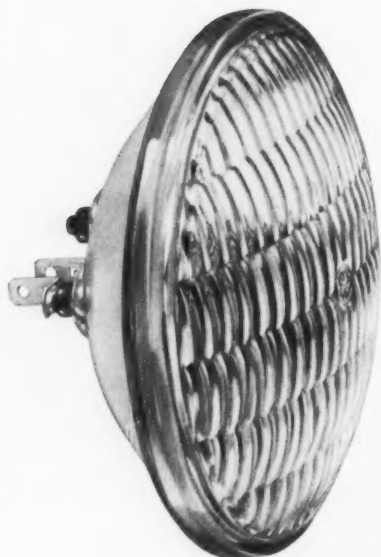


SLOT CUTTER — Concrete saw operator guides rig along chalk line to make raceway for wires that feed electricity to lights.

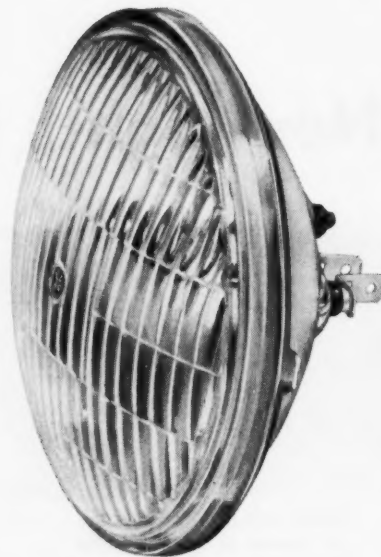


FINAL OPERATIONS — Epoxy resin is spread in drilled and cored hole (left) as workman waits to insert light. Widened section of raceway is junction box for wiring. Last step seals raceway with epoxy (above). Note installed lights fore and aft of operator's feet.

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4480	12	60	5 3/4"
4880	24	60	5 3/4"

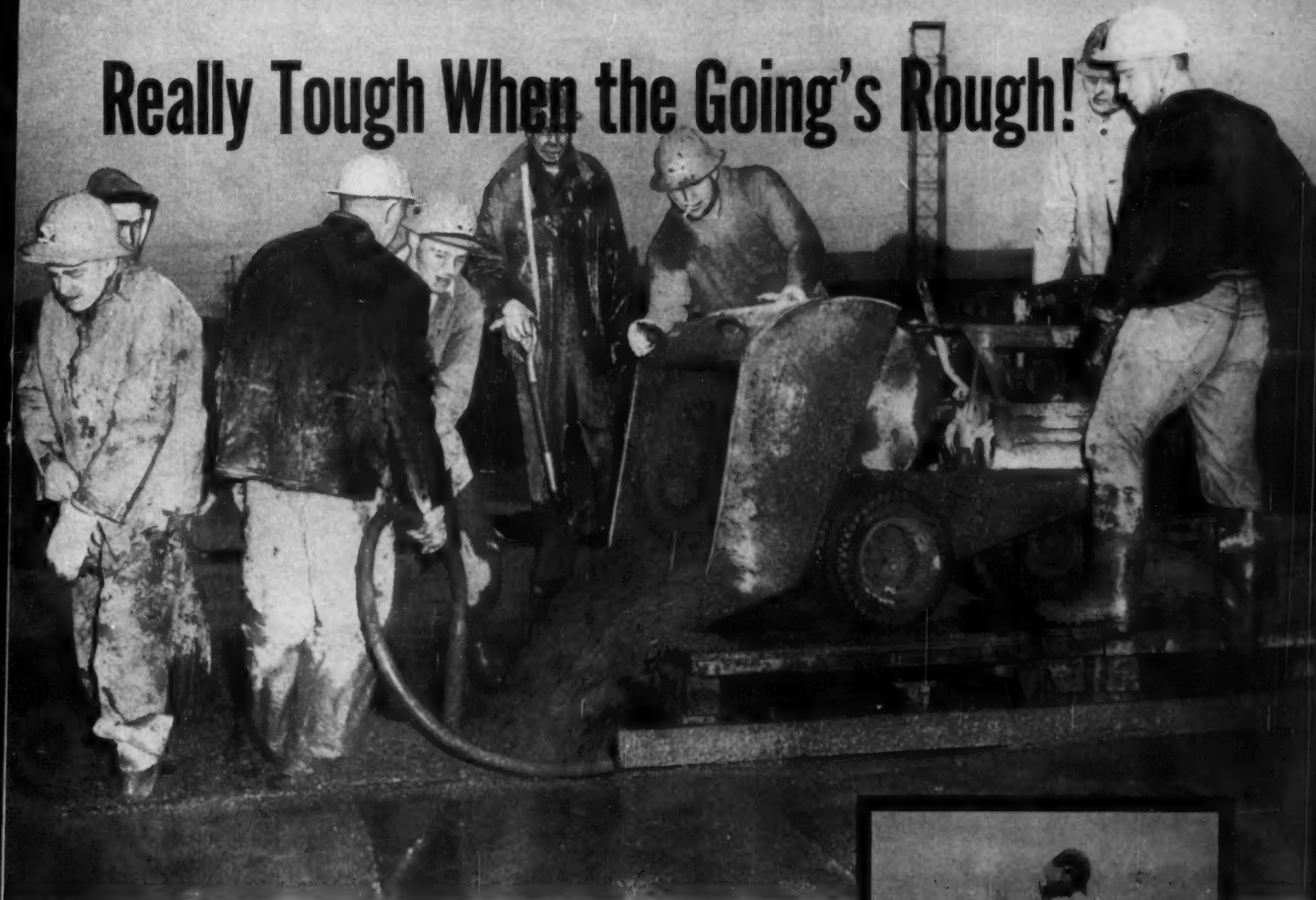
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It's a well-known fact that the Whiteman Power Buggy is the fastest, cheapest way to haul and place concrete. One Buggy does the work of five men with hand buggies . . . carries a full 11 cubic feet of concrete at a fast clip . . . over light scaffolds or soft earth . . . up steep ramps . . . through narrow doorways.

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New machines, new ideas

5 Michigan Tractor Scrapers and a 600 hp Michigan Tractor Dozer, on Southwest Interstate job, move 8,750 tons daily



Some new equipment and some unusual techniques are helping M. M. Sundt Construction Co., Tucson, Arizona, get an important 20% increase in production.

The new equipment includes five 375 hp, 29 yd Michigan Tractor Scrapers and a big 600 hp, 104,000 lb, Model 480 Michigan Tractor Dozer. The Scrapers are being push-loaded by the Dozer with an average of 35 tons in 35 seconds . . . this weight is extremely accurate since *each load is being weighed*, according to Arizona state regulations, by a state representative on a truck-type platform scale.

Borrow sprinkled 7 days

The unusual techniques were developed to speed dirtmoving and to more easily meet strict compaction specs. For

On this job, all loads are being scale-weighed. Records show faster, easier-loading Michigans are moving 20% more paydirt per day than similar-sized pans formerly used. Owner Sundt (left) also likes Michigan "design simplicity, ease of operator training," plus "best service I've ever seen, both from factory and dealer." Distributor is Western Machinery Co, Phoenix.



600 hp Michigan Dozer heaps 29 yd Michigan Scraper in 35 seconds.

increase production 20%

example, before digging starts, the dry, sun-baked borrow area is laced with perforated pipe. Water sprinkles out night and day for about a week. Once the soil is saturated seven to nine feet deep, Sundt turns off the water, removes the pipe, brings in his earthmoving machines. Pre-wetting, say men on the job—a 5.3 mile, \$1,031,000 section of Tucson-Benson Interstate Highway—makes for easier loading. It also has eliminated the clutter of water wagons and motor graders and extra sheepsfoot rollers which previously kept scrapers waiting in line to unload.

Success with Michigan Tractor Shovels prompts purchase of Scrapers, Dozer

Both the Michigan Scrapers and Michigan Dozer arrived on this job in mid-contract. "It wasn't that we were doing badly with our existing scraper-pusher fleet," explains Don Kellogg, Sundt's equipment supt., "it's just that we thought we could do better. We had excellent experience with Michigan *Tractor Shovels*, and so, because they have the same power train design, expected the same results with Michigan Scrapers and Dozers. We got 'em too. Moving 119,500 yds roadway excavation, 644,100 tons of borrow, 242,400 tons select and 49,000 tons aggregate base, we should finish 30 days ahead of schedule, *without changing our work day!*"

Higher scraper production is one reason, of course. Less downtime is another. "And good visibility," Ferris Ray, project manager, points out, "has reduced waste time. Scraper and Dozer operators can always see each other. No one has to blow horns or ring bells or stand up. Just a few simple hand signals coordinates all work.

Load at 7½ mph

"Scrapers load the 2800 lb/yd silty caliche mixture in second gear (7½ mph). They power-shift instantly to third (15 mph) as they're shoved off . . . move to and from the fill at speeds up to 30 mph . . . positively eject all loads." The result is 50 two-mile cycles *per Scraper* per 8-hour shift . . . 8,750 tons total . . . 20% more paydirt then previously moved by same size fleet of another make.

"The Monster"

The Michigan Model 480 Tractor Dozer is proving a remarkable pusher. The men have dubbed it The Monster. "It sure has power!" says Clay Smith, operator. "It loads these big Scrapers fast (usually in second gear 7½ mph) . . . backs up fast . . . goes from one borrow area to another fast (15 to 28 mph).

"In fact," continues Smith, "there isn't much this Dozer can't do fast. I've trimmed on 2-on-1 slopes and push-

loaded on a 2-to-1 slope. I'll admit I wasn't too happy when I was told I had to run the Model 480. I'd been a crawler man for years. But I sure changed my mind! The power-steered, power-shifted 480 is much easier to run—in fact, when I climb down off the machine at the end of a day, I'm still *rarin'* to go."

Built-in scarifier

Where borrow is tight and tough, an optional Model 480 attachment, blade-mounted scarifier teeth boost production. When dozing or pushing forward, these teeth fold up, out of the way. But on return operator drops blade, teeth jut out and rip 8 inches deep . . . just right for the next scraper pass.

Michigan units like these are helping dirtmovers all over the country boost production. Three Scraper models—10½, 19, 29 yds—four Dozers—162, 262, 375, 600 hp—are now available. Your Michigan Distributor will be glad to show them to you.

Michigan is a registered trademark of
CLARK EQUIPMENT COMPANY
Construction Machinery Division

CLARK
EQUIPMENT

2403 Pipestone Road
Benton Harbor 30, Michigan

In Canada:
Canadian Clark, Ltd.
St. Thomas, Ontario



After breaking up and truck-loading asphalt pavement, Michigan cut down hump-type island, then rough-graded prior to paving. "I like its versatility, balance, speed, economy," says Owner Carmen Otillo, . . . "also the fine service I get from my Michigan dealer, Equipment Distributors of Little Ferry, N. J."

Strips 2500 yds of asphalt in 8 hours with Michigan 275A Tractor Shovel

Fast 4-yd unit helps V. Ottilio cut costs 50%

All over the country, enterprising contractors are finding Michigan Tractor Shovels can effectively handle jobs once considered much too tough for rubber-tired equipment.

Here's a case in point.

V. Ottilio & Sons, Paterson, New Jersey, widening and resurfacing a 2½ mile stretch of U. S. Route 46 near Paterson, used one of their five Michigans, a 262 hp 4 yd Model 275A, to rip up and load old pavement . . . plus handle excavation for the new roadbed.

Pavement handled, mostly asphalt shoulder cover, averaged 4 to 6 inches thick—up to 9 inches in some places—weighed about 3200 lbs per cubic yard. Ottilio found the big Michigan, working alone, *handled the job 50% cheaper* than could a combination of machines.

Michigan replaces swing shovel, crawlers

Before the Michigan started work, Ottilio tried a 1¼ yd swing shovel and a pair of crawler pushers. Production was good, but not good enough. So, for more loading capacity, in came the 4 yd Michigan. It worked so well, the other rigs were taken off the job. Then, contractors thought they'd speed things still further by adding a 45,000-lb-class crawler. This move proved unnecessary! The increase was so small the crawler was retired *and the Michigan did the entire job!*

Versatile unit handles topsoil, old pavement, rough-grading

First, the 28 mph Tractor Shovel placed barricades and flashing-light stanchions. Then it stripped and truck-loaded top soil. Next, it broke out and loaded old

pavement. Next came excavation and loading out of all dirt in the center island. Last, the Michigan rough-graded sub-base to 12 inches below existing grade. (The old road was a four-lane divided structure with 10 ft inside asphalt shoulder strip and hump-type grassed center island 28 ft wide. The new road will have two new inside third lanes, with bituminous concrete shoulders and a narrow depressed center isle). Stripping and loading production ran as high as 3,000 bank yards in 8 hours. It averaged 2,500 yards a day—compared to 1,500 yards the old way. And costs on the \$380,000 contract, with one machine stripping and loading instead of two or three, were down "over 50%."

Keeps 15 big trucks busy

This boost in production—and cut in costs—under the considerations of the restricted work area—was one of the biggest surprises of the job, according to Carmen Ottilio, company president. Michigan's high speed and maneuverability were responsible. The 4 yd Tractor Shovel kept a fleet of 15 trucks busy (on a 2 mile haul). It loaded each of the 14 yd haulers with three bucketfuls in about a minute.

Make your own test

Like Ottilio & Sons, many other Michigan owners are finding this Tractor Shovel actually will improve production on jobs which have never before been tried on rubber. The complete power train—torque converter, power-shift transmission, planetary axles—was designed and built by Clark, specifically engineered to give Michigans more usable power and traction than you've ever seen on rubber. For proof, ask your Michigan Distributor to demonstrate. You name the job!



Despite narrow work area between open traffic lanes, maneuverable Michigan digs, turns and dumps so fast it loads 14-yd trucks in average of 1 minute. Unit has 4 yd bucket, lifts 22,000 lbs, can make non-stop U-turn in radius of 27'5".

Michigan is a registered trademark of

CLARK EQUIPMENT COMPANY
Construction Machinery Division

CLARK
EQUIPMENT

2403 Pipestone Road
Benton Harbor 32, Michigan
In Canada:
Canadian Clark, Ltd.
St. Thomas, Ontario



Speed was the answer to lost time caused by rain. Pushing in both directions at 4 mph...

Michigan Dozer loads

The forecast was for rain... and more rain. Same forecast yesterday... and the day before... and the week before. Already, Anderson Earth Construction Co., Calgary, Alberta, had lost 25 shifts. Even worse, only 40 shifts or so were left before freezeup. The job—500,000 yds of borrow, plus 40,000 yds of common excavation on a 3.14 mile stretch of new Highway #2 south of Calgary—*just had to be completed!*

Fleet includes two Michigan Scrapers

Even under this pressure, William Anderson, owner-manager of the firm, had a team he felt confident of—two

19 yd Michigan Tractor Scrapers, two 18 yd units and a rubber-tired 262 hp Michigan Tractor Dozer. Speed was the factor, felt Mr. Anderson, which could get the job done. "Basically," he says, "our confidence was founded on a loading method made possible by the Tractor Dozer."

This Michigan, *like all Michigans*, had the same gears, and speeds, both forward and reverse. Equipped with a pusher-block in the rear, it could push either direction with the full power of its 262 hp engine equipped with torque converter. Thus, by loading scrapers in alternate directions, all turns and all backup time would be saved.

Average load time —35 seconds

And so the final phases of the wet job proceeded. Load times in the water-soaked clay ranged from 25 to 45 seconds. Most pushes were made in second gear, averaging 4 mph. Loads averaged 14 to 15 pay yds. Even in this slippery footing, the Tractor Dozer with 29.5-25 hydroflated tires, four wheel drive, and a working weight of 56,680 lbs, had plenty of traction.

Dozer services 4 scrapers despite hauls under 1000 ft

Cross-sections showed it loaded 832

Michigan Dozer, pushing in reverse, heap-loads 19 yd Michigan Scraper with heavy, moist clay in just 35 seconds.



Push-blocks, front and rear, save backup and turning. In either direction, Model 280 Dozer heaps scrapers at about 4 mph.

832 pay yds per hour

pay yards per hour. This average was maintained hour after hour despite working conditions that were really rough on the operator. A standard 12-hour shift, for example. Four scrapers to push-load, one more than usual, even though most hauls were under 1,000 ft one-way. The loading pattern of alternating directions of push which while it cut waiting also gave the Dozer operator virtually no time to rest. Yet, because of its ease of operation, the Michigan Dozer and its one operator produced as much in their 12th hour of work as their first—an average of 10,000 pay yds per day.

Strips overburden, too

Michigan speed had another advantage. With a top speed nearly equal to the scrapers, the dozer traveled from one of the job's eight borrow pits to the next in a matter of minutes. Generally, it would go in ahead of the scrapers and quickly strip two to three feet of overburden before loading began.

"I'm convinced," says Mr. Anderson, "that these rubber-tired tractors will move a lot of prairie dirt in the future. They've sure got the speed."

Perhaps *you*, too, would like to be convinced of Michigan Tractor Dozer

power and capacity on *your* job. There are four models to choose from—162 to 600 hp. Also, check the matched Michigan Tractor Scrapers—same basic power train design, same engines, same controls, 10½ to 29 yd capacities. Select the sizes you want to see, then call your Michigan Distributor for a no-obligation demonstration.

Michigan is a registered trademark of
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Construction Machinery Division

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**SPEEDY
DELIVERY
FROM
STOCK...**



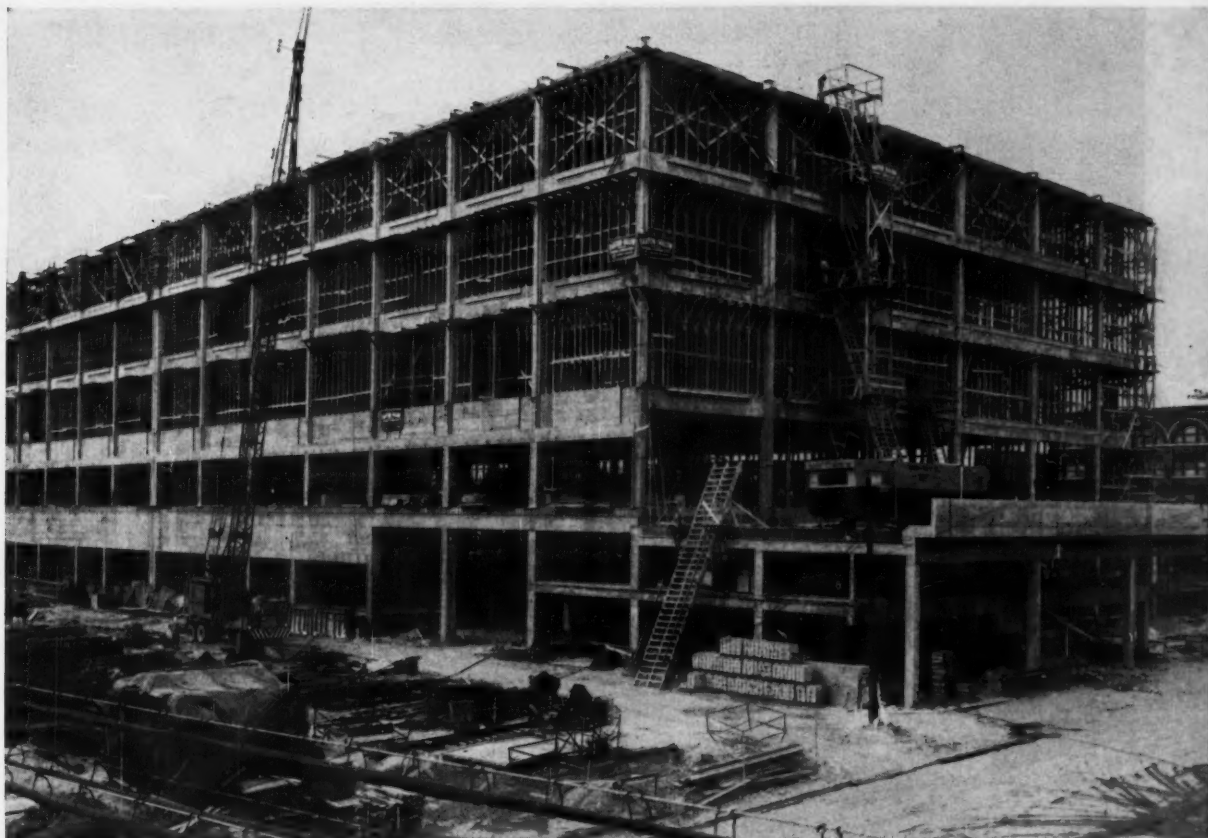
In the market for lag bolts? We make a full line
of sizes. Carriage and machine bolts also.
And they're all top quality.

*For strength
... economy
... eye appeal*



BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL



SHORING—Contractor provides support for three floors until all the slabs reach their design strength. The building has 800,000 sq ft of floor area supported by reinforced concrete columns cast in place. Each slab measures 267x594 ft.

Complex System Shores a Massive Building

Shop-built timber falsework permits this contractor to strip out floor forms while vertical shoring remains in place to support three consecutive floors at one time.

SHORING for a five-story post office building under construction in Detroit is a complex procedure. Barton-Malow Co., general contractors of Detroit, designed falsework that lets them remove the horizontal shoring to strip out floor forms while the vertical shoring remains in place to support the concrete floor slabs.

The structure, designed as a mail-handling facility, is part of a \$20-million United States Post Office that will include an adjoining 10-story structural steel office building when the job is complete.

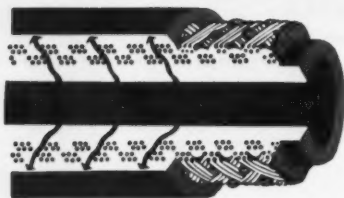
The mail-handling facility has a total of 800,000 sq ft of floor area supported by reinforced concrete columns, all of them cast in place. Each 267x594-ft floor provides 160,000 sq ft of space.

The building has a small amount of structural steel. This includes a 53,000-sq-ft section, 95x550 ft, on the second floor. The steel carries portions of the second floor slab over truck loading areas at three sides of the building.

The contractor has to shore three floors at all times until the slabs reach their design strength. They maintain falsework not only under the slab that is being cast but under the two slabs directly below it, as well.

The falsework consists of a series of prefabricated timber bents, shop-built by the contractor. The bents, spaced in parallel rows 14 ft apart, are joined at the ends by 2x12-in. cross bracing and 2x6-in. ties at the top and bottom. Each bent has five 4x6-in. posts, placed at 3-ft 3-in. centers and connected by a 4x6-in. header and a 1x6-in. bottom plate. Each post supports 7,000 lb of floor slab.

continued on page 174



"MORE USE PER DOLLAR"

Rubber tie-gum penetrates Homoflex braided plies to provide an inseparable tube-to-cover bond. More flexible and lighter weight than any hose for equal pressure.

R/M HOMOFLEX HOSE HANDLES EASIER... LASTS LONGER

Homoflex Air Hose is mandrel-made with *no* pre-set twist—it coils and uncoils freely in *any* direction *without* kinking! It's the easiest handling hose you can use with air drills. Exclusive Homoflex construction makes strength member and tube virtually inseparable, assures long, trouble-free service life. Uniform inside and outside diameters permit faster, easier, *safer* coupling . . . faster, fuller flow.

Strong, light weight, and "flexible as a rope", Homoflex Air Hose adds up to real labor and cost savings on the toughest jobs. Homoflex H.D. Air Hose is also available for extra heavy duty and *with yellow cover stripe* for visibility; also in type for water in mine use.

- SUPER STRONG
- PRECISION BUILT
- LIGHT WEIGHT
- FLEXIBLE AS A ROPE

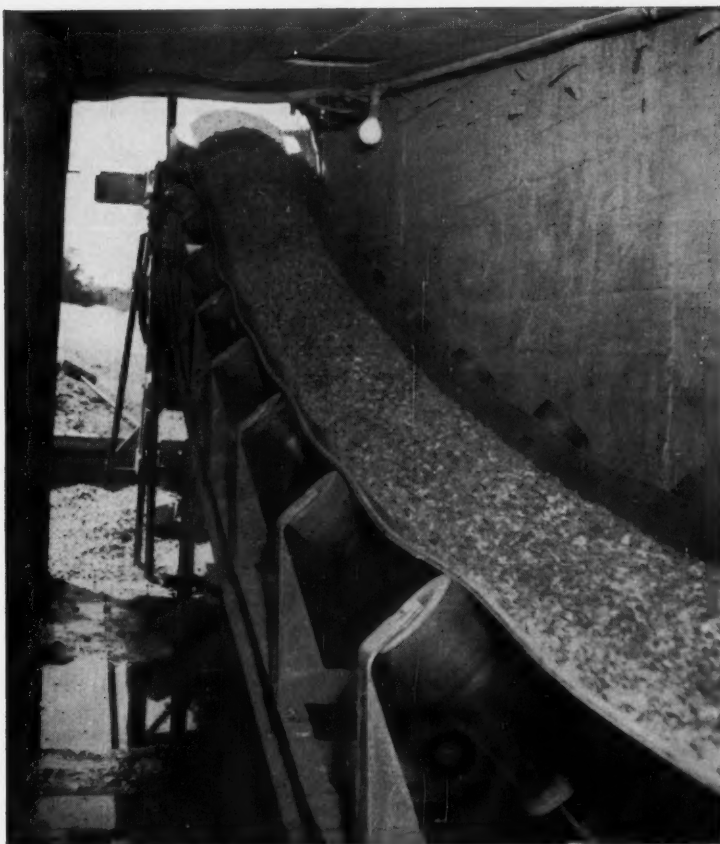
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RM-1017

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MANHATTAN RUBBER DIVISION, PASSAIC, NEW JERSEY

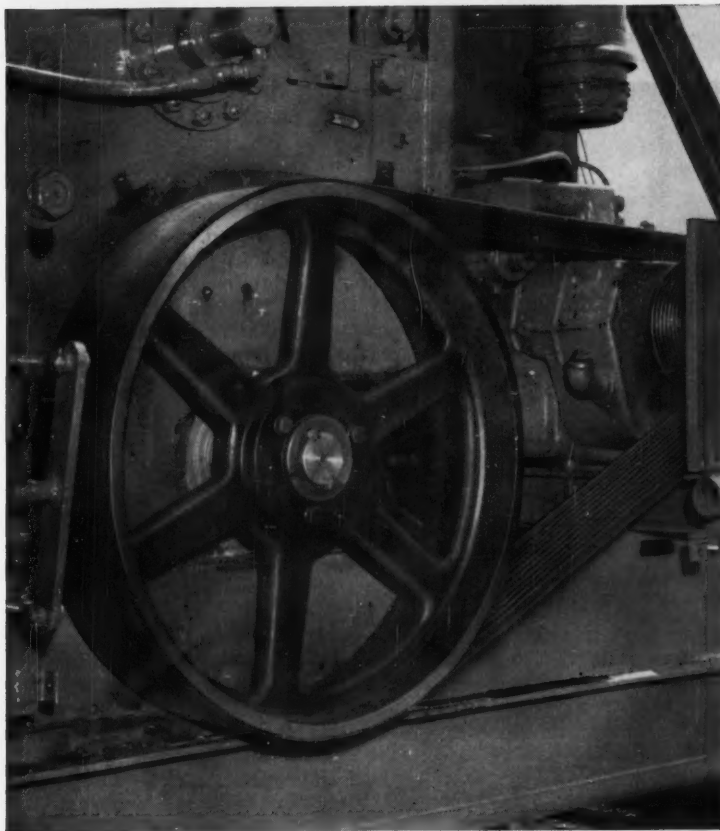


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PRODUCTS
... "MORE USE
PER DOLLAR"



RAY-MAN CONVEYOR BELT *Engineered for 45° Idlers*

You can now get up to 60% greater hauling capacity—save up to 20% on conveyor costs—as compared to using regular 20° idlers. Ordinary ply belts are too stiff and boardy to do the job—Ray-Man's exclusive flexible construction and built-in stress compensation is *guaranteed* to take the sharp angle of 45° idlers *without* ply or cover separation at the hinge line. Learn how Ray-Man Conveyor Belt opens up a whole new era of conveyor design . . . permitting larger loads . . . narrower conveyors—assuring longer cover wear, lower handling costs! Write for Bulletin M303.



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- SINGLE UNIT V-RIBBED DESIGN
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Just two Poly-V belt cross sections meet every heavy duty power transmission requirement.

R/M Poly-V* Drive is the smoothest and coolest running—*longest wearing* drive you can install. Discuss your application with an R/M Distributor . . . or write for Poly-V* Drive Bulletin M141.

*Poly-V is patented by Raybestos-Manhattan, Inc.



TELESCOPIC BEAMS—Pecco horizontal shoring spans 14 ft between bents to support floor forms. After slab is cast, beams are shortened and lowered to the ground. Then the floor forms are stripped out.

PLACING BEAMS—Two workmen can carry one horizontal shoring beam with ease. They place bearing prongs between plywood strips nailed to top of headers.



SHORING MASSIVE BUILDING ...

continued from page 171



FALSEWORK — Crews place 9x12-ft forms for floor while they erect the falsework. Each prefab section is marked for location.

Barton-Malow devised a technique that enables them to strip out 9x12-ft panel forms of $\frac{3}{4}$ -in. plywood for the floor slabs without breaking down the shoring. The key members are Pecco telescopic shoring beams that support the floor forms. The adjustable beams span between the rows of

bents; they are supported by the headers over each post.

The bearing prongs at the ends of the beams fit in between $\frac{1}{2}$ -in. plywood strips that are nailed to the top of the header. This distributes the weight of the floor slab over the header so that the beams can be telescoped with a

pinch bar. About 72 hr after each slab is poured, the beams are shortened and lowered with a Lull fork-lift truck. Then the forms are stripped out for reuse.

Falsework is transported to the site as it is needed. Each bent is marked for exact location so that it is impossible for crews to make a mistake in forming a drop panel or any irregularity. The reinforcing spirals and prefabricated sheetmetal forms for columns and column capitals are positioned in conjunction with the falsework. In all, 1,700,000 sq ft of forms were erected for the building.

For that part of the building that has no structural steel, the columns form 21 bays down the length of the building and seven bays across the width, with 29 ft between columns. Diameters of the columns decrease from 22 in. for the ground floor to 20 in. for the top floor. Floor heights vary. From the ground floor to the second floor, there is 26 ft. Between the second and third floor and third and fourth floor there is 19 ft. Between the fourth and fifth

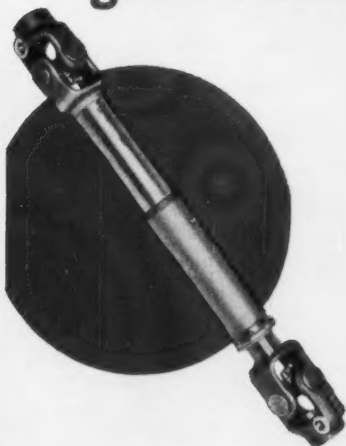
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80 TONS...

A BIG PROBLEM IN CONTROL



BLOOD BROTHERS jointed steering assembly guides giant LeTourneau-Westinghouse coal hauler!



Another Product of...

No matter how large the equipment you design, there's a Blood Brothers steering or jointed driving assembly big enough to do the job. One example of the use of Blood Brothers components on large equipment is the L6S Steering Assembly on the LeTourneau-Westinghouse Haulpak Coal Hauler.

This mammoth, highly maneuverable "mountain mover" is a bottom-dump 450 h.p. diesel unit that weighs 37 tons. Yet it carries $2\frac{1}{2}$ times its own weight in payload, or the equiv-

alent capacity of over one and one-half standard 50-ton railroad cars!

Rockwell-Standard's Universal Joint Division offers you a wide range of specialized engineering experience—involving everything from manual steering assemblies... to power take-off drives... to heavy-duty propeller shafts. Whatever size and type equipment you manufacture, Rockwell-Standard can save you time, money — help you achieve higher standards of performance. Let us prove it—on your project!

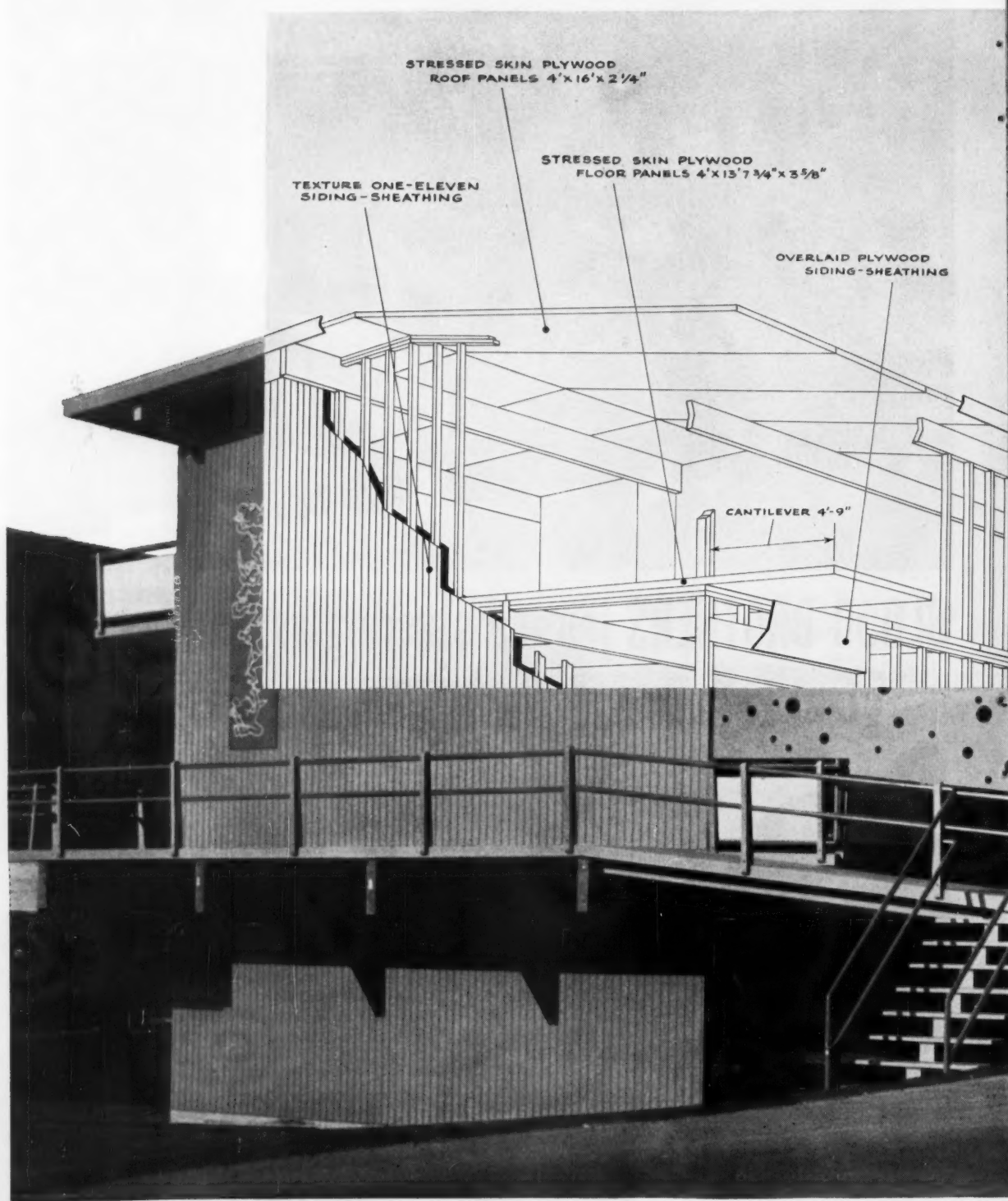
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ROCKWELL-STANDARD
CORPORATION

Universal Joint Division, Allegan, Michigan



Fir plywood components and cut over-all costs 15%



"Sturd-i-wall" construction on 26-unit apartment

Two relatively new time-saving techniques keyed to the use of fir plywood were credited with saving \$16,000 on this apartment project. It cost some 15% less than comparable construction using other materials.

Stressed skin plywood components cut labor 75% compared with conventional roofing and flooring methods. Precisely engineered and factory fabricated under controlled conditions, panels had fir plywood top and bottom skins pressure glued to light lumber framing, with insulation sandwiched inside. Used at all three levels, they provided ceiling and underlayment or ceiling and roof decking in one unit.

Plywood stressed skin components like these offer maximum strength with minimum bulk. Their use is growing on buildings of this size and larger, for struc-

tural superiority and sharp reductions in on-site labor—in some cases as much as 85%.

"Sturd-i-wall" construction (one layer of plywood as combined siding-sheathing) was the other cost cutter, saving an estimated 15% on wall costs. Texture One-Eleven® (vertically grooved) plywood and medium density overlaid plywood were nailed directly to studs. The Sturd-i-wall system has proved its strength and economy in home building. As seen here, it offers comparable advantages in larger projects as well.

For more information about fir plywood, write (USA only):

DOUGLAS FIR PLYWOOD ASSOCIATION
TACOMA 2, WASHINGTON

—a non-profit industry organization devoted to research, promotion and quality control



Stressed skin panels have wiring run through; insulation and sound-proofing are excellent. Panels are light, easily handled by two men.

Texture One-Eleven nailed to studs made a stronger, more rigid wall than one with conventional sheathing and siding—in half the time.



TILlicum APARTMENTS
LOCATION: Winslow, Wash.
ARCHITECTS: McCool & Morgan, Seattle
CONTRACTOR & OWNER:
Edmund Stafford, Winslow
COMPONENT FABRICATORS:
Panelbild, Lynnwood, Wash.

SHORING MASSIVE BUILDING . . .

continued from page 174

GROUT MUD SILLS—Falsework for second floor rests on grout mud sills. This procedure enables contractor to bypass, temporarily, pouring of the ground floor slab.



floor and fifth floor and roof there is 18 ft.

The columns rest on 333 caissons sunk 104 ft to bearing. Foundation work was handled by Raymond Concrete Pile Co.

To get a jump on winter weather, Barton-Malow decided not to cast the ground floor slab until the floors above it and the roof were finished. They provided a firm base for the shoring by pouring grout mud sills, 2 to 6 in. thick depending upon grade, 2

ft wide and 160 ft long. When they completed the upper stories, they ripped out the grout and poured the ground floor under cover.

It takes 2 weeks and 1 day from the time pouring begins on one slab until pouring begins on the next higher slab. First they pour the columns; then they cast the capitals, drop panels, and floor slab in a continuous pour. The slab is divided into six nearly equal areas of about 80x200 ft with the divisions made at expansion joints. All slabs are 9½ in. thick. Each floor requires 4,500 yd of concrete.

All the pouring is handled by two Northwest 25-ton truck cranes with 100-ft booms and 30-ft jibs. Each crane alternates between two Gar-Bro 1½-yd buckets that are supplied by transit-mix trucks. The buckets feed two Gar-Bro hoppers, one a single and the other a double hopper, mounted at the edge of the floor being poured. Five Whiteman Power Buggies carry concrete along runways.

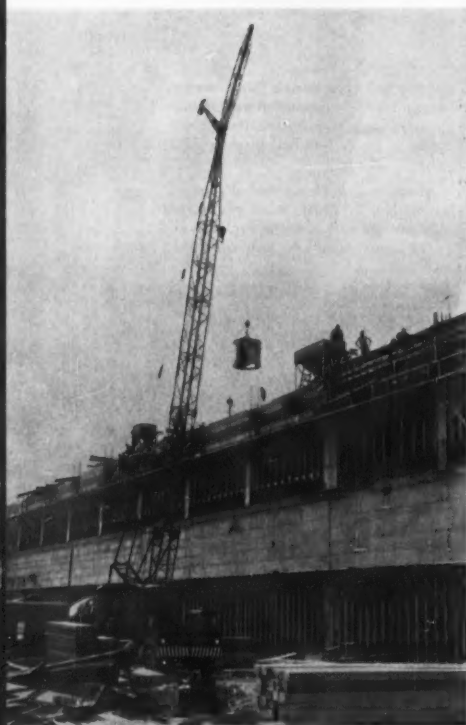
With the two crane setup, the contractor reached a peak pro-

duction of 825 yd in a 10-hr day. One crane can handle as much as 78 yd per hr, and the buggies can deliver better than 100 yd per hr, but Barton-Malow never had occasion to press their equipment to these capacities for extended periods.

Special Runway Jacks

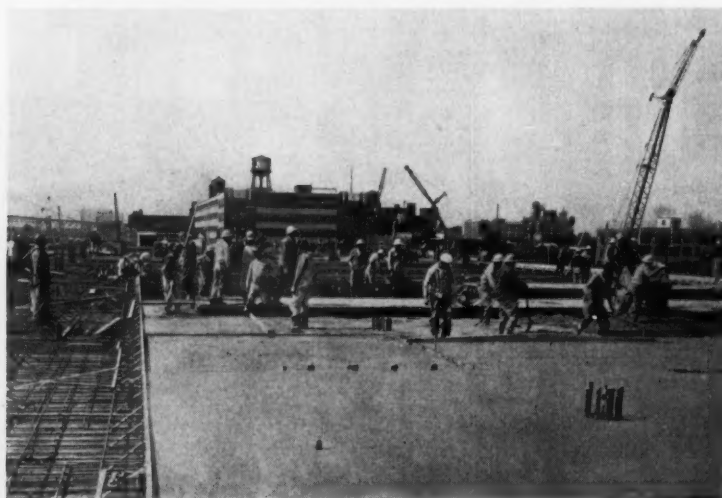
Runways for the concrete buggies are made of planked sections 10 ft wide and 4 ft long. To support them, Barton-Malow made special jacks, or chairs, of steel angles welded to pipe legs. Jacks are 15 in. high, 1 ft wide, and 4 ft long. Three of them support a runway section. Planking on the runways is placed in the direction of buggy travel. Barton-Malow finds this makes a smoother ride and prolongs runway life.

Floyd Weiland is general superintendent, Larry Barton is assistant general superintendent, Bill MacLachlan, Jr., is field engineer, and Roger Elrod is job superintendent for Barton-Malow. W. P. Bartling is field superintendent for Giffels & Rossetti, architects and engineers.



CONCRETE GOES UP—Two 25-ton Northwest cranes hoist concrete to two Gar-Bro hoppers.

CASTING—Whiteman buggy supplies crew with concrete. Peak production was 825 yd in 10 hr.





When this photograph was taken, 8,000 yards of right-of-way had been cleared of trees, and the roadbed was being prepared for surfacing.

"Sinclair Helped Cut Maintenance Costs On Every Mile of Our Northway Section"

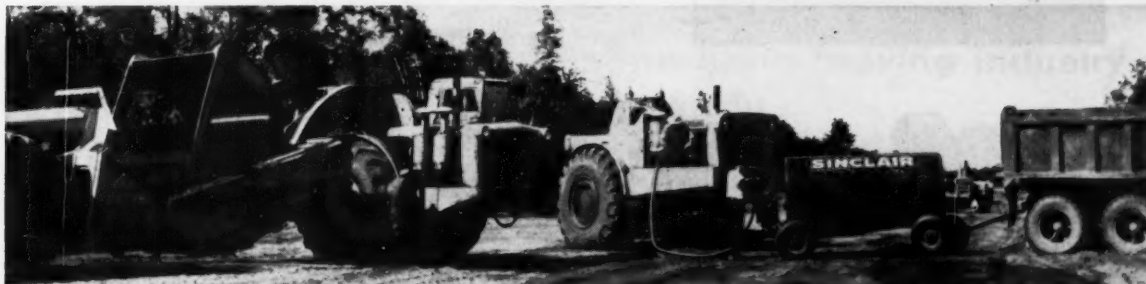
says J. Hanna, Superintendent,
D. A. Collins Construction Company

The Northway, another link in the nation's grid of superhighways, connects the New York State Thruway with the Canadian border. Mr. Hanna says, "Our heavy-duty equipment took the toughest kind of punishment on this project. Work ranged from ripping out trees to building bridges. Yet our maintenance costs were far below what we anticipated. Much of the credit must go to Sinclair's service and their high quality fuels and lubricants. They kept our equipment operating at peak efficiency . . . *on schedule*. These are reasons enough why we use Sinclair Products exclusively."

If you haven't discovered the cost-cutting possibilities of Sinclair services and products, see your local Sinclair Supplier — or write Sinclair Refining Company, Contractor Sales Dept., 600 Fifth Avenue, New York 20, N. Y.

Sinclair

Fuels and Lubricants



Mr. Hanna reports, "The portable trailer tanks Sinclair loaned to us contributed greatly to the speed and efficiency on our section. We were able to refuel on the job . . . *fast*, and keep our equipment working *full time*."

45,000 MILES IN 5 MONTHS . . .
American Utilities Haul the Behemoths*
of Construction on this LaCrosse Rig

*D9 *TC-12 *NORTHWEST 6 *KOEHRING 405 *DW21



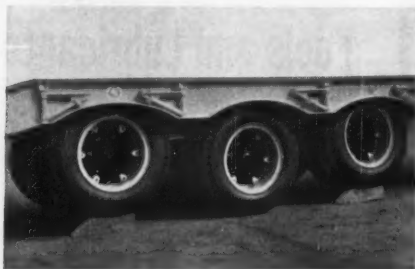
This DW21 nestles on AU's LaCrosse Three-Axle Trailer; low gooseneck provides ample clearance for the prime mover in conformance to midwest clearance restrictions.



Mr. Versaw, right, applauds the 48" axle spacing and 20" tires that reduces tire wear and makes a smoother haul on his LaCrosse Trailer.



LaCrosse triple axle single point suspension design permits all points of oscillation on the same plane, equalizing load distribution without bending or mechanical distortion. Illustrations above and below demonstrate the flexibility incorporated into the LaCrosse triple axle design.



● It used to be removal of tracks, drawbar, dozer, ripper and even seat pillows to scale down big crawlers and shovels to meet state highway weight restrictions.

But the new, painless way is exemplified by American Utilities, Inc. which moves the D9, TC-12, DW21 and other behemoths of construction on the LaCrosse Triple Axle Lowbed Trailer.

Last summer, this Ralston, Nebr., general contractor hauled the big machines all over a 5-state area, clocking 45,000 miles on its Three-Axle rig in 5 months! Not one iota of trailer trouble either, reports Robert Versaw, the firm's president.

For more trouble-free performance, the firm's 18-ton LaCrosse Tilt-Deck trailer does equally as well.

On-the-go in construction, LaCrosse Trailers are setting impressive performance records in hauling the big machines. A full line of quality trailers provides you with the options you need to be legal in your area. And there's a *written one-year warranty* that gives you extra confidence in your LaCrosse Trailer purchase.

See your dealer who sells the **LEADER IN LOWBEDS**. That's your LaCrosse Dealer.

LC-64

LaCROSSE

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LACROSSE TRAILER CORPORATION

418 Gould Street • La Crosse, Wisconsin

Ask the man who runs the rig...

***no one makes
a tougher tooth
than ESCO***



The right design, the right steel, the right shape make *ESCO* Points and Adapters right for every digging condition.

**The earth moving industry
looks to**



Electric Steel Foundry Co., PORTLAND, OREGON

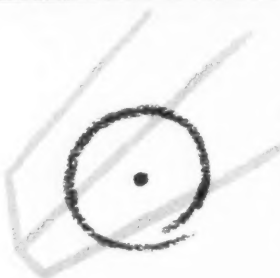
See reverse for shapes and size range ➤

Here are the points to remember...

**12M
ALLOY STEEL**

ESCO 12M Points are the toughest you can buy. Developed through years of research for the construction industry, cast *ESCO* 12M is carefully heat treated to produce the finest steel made for the severe shock and abrasion encountered by points and adapters.

**RIGID QUALITY
CONTROL TESTS
ASSURE
TOUGHNESS,
HARDNESS**



Every *ESCO* Point is Brinell tested to assure the exact degree of shock-absorbing toughness and abrasion-resisting hardness for longer digging life. Be sure to look for the Brinell mark on every *ESCO* Point you buy.

8 POINT SHAPES

You can select from eight different shapes to find the point that matches your digging conditions. *ESCO* Points are designed by bucket and excavation specialists who know how to achieve top digging performance. The self sharpening design of an *ESCO* Point makes it start sharp and stay sharp.

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for all digging equipment**

Your local *ESCO* dealer can supply Points and Adapters for all your digging needs. By using *ESCO* Points and Adapters on all your equipment you can cut costs further by reducing your point inventory and consolidating purchases. Call your *ESCO* dealer today for details. He's listed in the yellow pages of your telephone directory. Or, write direct.

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GENERAL PURPOSE

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SHARP FLARED

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Batch Truck Operation Is Key to Paving Efficiency

A SHORT CYCLE TIME at the paver is one of the most important factors in reducing paving costs, according to a report from the Bureau of Public Roads. The cycle time, in turn, depends upon efficient batch truck operations in recharging the skip.

The mixing time and the time required for moving the skip through its cycle are nearly constant, and any reductions in the cycle time must be made in the reloading of the skip. This operation involves three separate time elements:

1. Backing the batch truck up to the skip
2. Dumping the batch and moving the truck out
3. Waiting a moment for the paver operator to react after the truck clears the skip.

The last element can be considered a constant 2 sec. This leaves the batch movements the only area where delays in the paving operation can be reduced.

Time-Saving Suggestions

To avoid these delays or at least keep them to a minimum, the Koehring Div. of Koehring Co. makes the following suggestions:

1. Use batch trucks of four-batch size or larger.
2. If possible, have the gates in the batch body operated by air controls from the driver's cab. If manual gates are used, keep them in good repair and fasten ropes to the tripping levers so the truck spotter can reach them easily.
3. Keep the body of the batch truck in the raised position throughout the dumping of all of its batches. If the driver has to raise the body each time he backs into the skip, he will lose from 8 to 20 sec per batch.
4. Build a 4 to 8-in. chute on to the discharge end of the truck bed. This permits a better throw of the material into the skip and gives a truck with a short bed better dumping clearance.
5. Have the truck remain as close as is safely possible to the



SHORT INTERVAL BETWEEN TRUCKS—A full batch truck, waiting with its body raised, is positioned just clear of the turnout radius of the truck in discharge position at the skip.

skip between the dumping of batches. If the truck waits 8 to 12 ft too far ahead of the skip, 2 to 3 sec will be lost in backing up to dump its batch.

6. Position the next waiting full batch truck just clear of the turnout radius of the truck at the skip. A full truck can lose several seconds backing across an unnecessarily long space left open between the two trucks.

Job Practice

These principles (photos) were put into practice by Sundt & Bevanda, joint venture contractors, on a paving job at the Marine Auxiliary Air Station at Yuma, Ariz. The \$4.1-million contract involved a total of 140,000 cu yd of concrete and covered 13,300 ft of 200-ft-wide runway and 13,300 ft of 75-ft-wide taxiway.

The contractor used Cook Bros. trucks with five-batch dump bodies. Batch trucks were getting in and out in 6 to 8 sec and had no difficulty keeping up with a Koehring Tribatch paver.



GATE CONTROLS—If possible, gates in the batch truck dump body should be air-operated from within the driver's cab. Sundt & Bevanda used manual gates and tied ropes to the tripping levers so the truck spotter could operate them from the ground.

interchange this



...get 3 to 7% higher

Segmented roll is easily field-mounted on any Buffalo-Springfield tandem . . . gives you more uniform compaction . . . higher densities per pass

A quick-change of guide rolls and you combine the special advantages of a projecting-lug roll — plus those of a smooth-faced roll — all in a single pass! Result: Up to 7% higher compaction densities on stabilized base-materials, crushed or broken stone, hot and cold bituminous mixes, earth-fills.

IN OTHER WORDS . . .

For any Buffalo-Springfield tandem roller, new, or in the field, your small investment in segmented-roll attachment virtually gives you two machines in one. You convert to segmented guide-roll for faster higher-density compaction . . . switch back to smooth-faced roll as job requirements demand. You *tailor* your machine to the job . . . meet specs faster and more profitably.

If you're interested in this flexible approach to more profitable rolling, send coupon for new 6-page bulletin. It tells the full story!

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B-1 CME

HOW SEGMENTED ROLL GIVES GREATER, MORE UNIFORM DENSITIES



Segmented pads enter vertically, with practically no lateral displacement of surface material. There's no build-up of material ahead of roll.



Spacing between staggered pads results in more compaction weight per unit of contact area. Compactive effort is from lower elevation up . . . results in more uniform top-to-bottom compaction.



Broad-faced special designed pads make clean exit . . . eliminate fluffing up of surface material, as occurs with lugs of sheepfoot roller.



Because of bulb-shaped compactive effort, area below surface is knitted tightly together in pattern of uniform density.

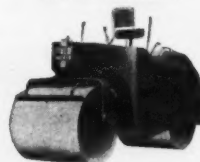


Follow-up action of smooth-faced drive roll easily takes care of shallow, web-shaped areas not compacted by segmented pads. (See photo next page.) End result: smooth surface, with uniform high-density compaction underneath.

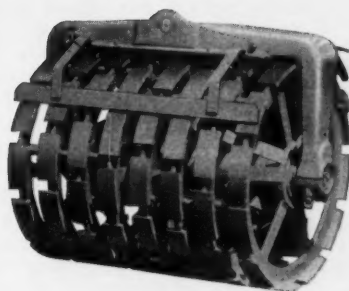
Portable tandems

Two-axle tandems

The right roller for you



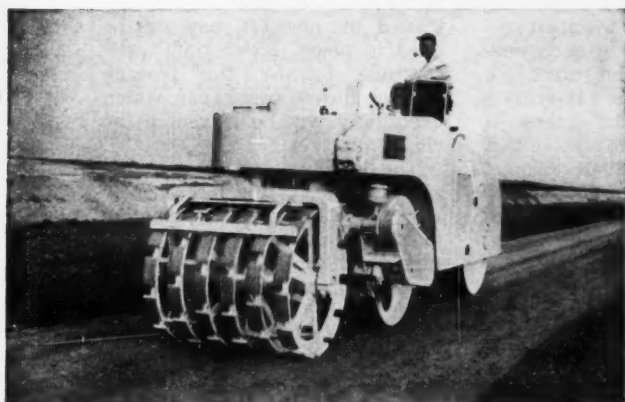
with this



compaction densities



SEGMENTED ROLL is faced with staggered rows of heavy steel pads . . . applies pressure in foot-print pattern. Roll is split in two free-rolling sections to minimize surface scuffing when making turns. To fit your needs for permanent or interchangeable use, they are available with or without separate axle and/or yoke.



TWO AXLE TANDEM with segmented roll works on airport project in Ohio. With one machine and one operator, this contractor combines advantages of both crawler-drawn sheepfoot roller, and conventional tandem roller . . . all in a single pass.



THREE-WAY COMPACTION ON EVERY PASS is achieved here, compacting sub-base for airport runway in Columbus, Mississippi. Three-axle Buffalo-Springfield roller above uses segmented lead guide roll, vibratory center guide roll, followed by smooth-face drive roll.

3-wheel rollers



Pneumatic rollers



K-45 Kompactor



3-axle tandems



3-axle vibratory



BUFFALO-SPRINGFIELD COMPACTION EQUIPMENT • FLANERTY SPREADERS AND SWEEPERS • STARDRILL-KEYSTONE DRILLING MACHINES



OLD SPAN OUT—Steel falsework erected on twin barges lifts old fixed span from piers as tide rises. Pumping water ballast out of the barges helps speed removal of the 533-ft-long fixed span.

NEW SPAN READY—Completely prefabricated on falsework on top of barges, new lift span containing 2,670 tons of steel waits tied up alongside railroad bridge for the floating-in operation.



542-Ft Lift Span Floats Into Space

IN A THREE-DAY operation that stuck to a schedule as tight as any drawn up for a military maneuver, an American Bridge Co. crew harnessed the tides to float into place a new lift span for a bridge carrying the tracks of the Pennsylvania Railroad over the Delaware River at Philadelphia, Pa.

At low tide on the first day they maneuvered barges into position beneath the fixed span being removed to make way for the new one, and cut the bearing shoes connecting it to the adjacent piers. Then, as the tide rose, they pumped water ballast out of the barges, finally lifting the span onto steel falsework erected on the barges to hold it. Tugs then towed the span upriver to a dock where it was dismantled.

Three days later they reversed the procedure. At high tide they floated the new span, supported by falsework on barges, into position between the piers. As the tide ebbed, they pumped water into the ballast tanks of the

barges until, finally, the span settled onto the piers at each end.

The largest double-track lift span ever floated, the 542-ft-long lift section weighs 2,670 tons. It replaces an old swing span that provided only a 120-ft channel for passing ships. The 500-ft clear span of the new lift section will permit safe passage of the largest ocean-going vessels.

New Piers Go In Early

Three additional piers were needed to seat the new lift span and its towers. One old pier on the Pennsylvania side of the river will help support the lift tower at that end. A new pier alongside the old one will hold the other legs of the tower and the end of the lift span. It replaces an old pier that will be demolished. Two new piers on the New Jersey side will hold the other end of the lift span and its tower.

Until the 186-ft-high towers are erected later this year and the elevating machinery is in-

stalled, the new lift span will be fixed in place. River traffic will continue to use the passage through the old swing span, which eventually will be locked in the closed position.

The floating out of the old fixed span and the floating in of the new lift span marked the culmination of more than three years of planning. American Bridge waited for tides in the river, which average about 7 ft through most of the year, to reach a maximum before scheduling the operation.

Floating out the old span took about 3 hr. Three tugboats, all on the downstream side, positioned the two barges carrying falsework and held them between the piers as the tide ebbed.

When the tugs had lined the twin barges between the piers, the crew placed wire-rope cross bracing between the ends of the barges and the adjacent piers. Wood softeners protected the sides of the piers where the wire rope wrapped around them. They



On Tide

also placed wire rope and Coffing hoists between the span and the top of the steel falsework to help guide the barges to proper position.

As the tide slacked, the tugboat maintained sufficient power to overcome the current and hold the barges in position. When the tide changed from ebb to flood the tugs shifted to the other side of the barges. At this time enough water ballast was pumped out of the barges to raise them about 1 ft, to pickup the fixed span with the 50-ft-high falsework.

Tide Carries Span Clear

With the span settled securely on the falsework, workmen let out on the wire ropes fastened to the downstream sides of the piers at each end and tightened the other lines running to the upstream sides of the piers, thus permitting the tide to carry the barges upstream clear of the bridge. The tugs then maneu-

vered barge and bridge section into the center of the river channel and towed them about 2 mi upstream to a dismantling dock.

American Bridge had previously completed fabrication of the new lift span atop 375 tons of steel falsework on four barges. They tied the barges up alongside one of the three 533-ft fixed spans of the bridge until they were ready to place the new span.

Early in the morning of the day selected for the floating-in operation, just as the tide reached flood stage, the erection crew released the barge assembly from its moorings by letting out on the wire rope bracing holding it alongside the bridge. Four tugs pushed the loaded barges into position between the piers. Two of the tugs provided the push to move the barges sideways until centered between the piers while the other two bucked the current of the flooding tide.

As the flood tide reached its crest about 6 am, the tugs on the upstream side of the barges maneuvered the span into alignment between the piers. Then a work boat placed wire-rope cross bracing between the outboard barges and the adjacent piers to hold the span in position. They also placed breast lines at each end and laced the ends of the span to the piers.

Just before the tide changed, the two tugs on the upstream side moved to the downstream side to hold the barges until the

span unloaded on the piers as the tide ebbed. The crew pumped water into the barges to hasten the settling of the span. About 12 hr after the operation started, the new lift span was securely anchored on its piers.

During the three-day operation, freight trains were detoured through Trenton, N. J., and passengers traveling between Philadelphia and Camden were shuttled across the river by bus. Except for this short interruption in service, an average of 24 trains per day rolled across the bridge while reconstruction progressed.

Dredges Deepen Channel

Cost of the bridge work was about \$12.5-million. In addition to the bridge reconstruction, the Corps of Engineers is dredging a 40-ft-deep and 400-ft-wide channel along a 37½-mi stretch of the river. Total cost of the project, now about 40% complete, will be \$80-million.

New York City consulting engineers Hardesty & Hanover designed the new lift span. The Philadelphia District, U. S. Army Corps of Engineers, supervised the construction in conjunction with the Pennsylvania Railroad. Colonel T. H. Setcliffe, district engineer, was in charge.

Contractor for the substructure was John F. Casey Co. of Pittsburgh. American Bridge Division of U. S. Steel Corp. erected the superstructure.



NEW SPAN IN—The culmination of a three-day operation, new lift span settles onto its piers as ebbing tide lowers barges. Later, elevating towers will be erected on twin piers at each end of span.

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And that means more than size. It means adequate warning to protect the public . . . your workers . . . and you! The new Dietz Visi-Flash 685 does just that because it's . . .

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Cleveland 140 digs 38-mile Idaho gas extension

Massart Construction Company of Spokane, Wash. used a Cleveland 140 to dig a 38-mile gas line eastward from Moscow, Idaho to serve a new refractory at Boville, another brick plant at Deary and smaller users along the line. The Cleveland dug the line 40 inches deep for 4 and 6-inch pipe at a rate of better than 2 miles per day.



Typical of the entire Cleveland Trencher line, the 140 provides over 30 non-slipping digging wheel speed-and-power combinations—a choice that gives maximum trench production in all soils and terrains with greatest economy for every type and size of digging within its range.

For gas distribution and service lines, for gathering and transmission lines...for pipelines of every kind...for water and sewer lines...for drainage and irrigation systems...for every trenching requirement...for dependability, speed and economy...nothing digs trench like a Cleveland.

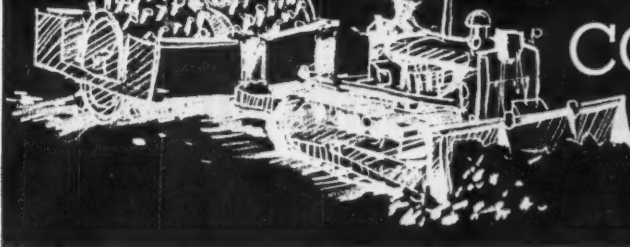
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2. RECONNAISSANCE, MATERIALS AND TESTS

THE ECONOMICS of earthwork construction start with the proposal to do the job. To bid intelligently, the contractor should intimately examine the job site to answer such questions as:

Where is bed rock? What kind of soil is at the job site? Will it hold the overburden of a fill? Will there be undue settlements or slides? Is it suitable for compacted embankments? If it is not, how far to the nearest acceptable borrow? What is that soil like? Is haulage distance economical? Are there good roads between borrow and site? Where is the water table at the site and at the borrow? Is the water table permanent or seasonal? What are the drainage patterns? Will there be flooding and runoff at either place? Will water be available at the borrow? Will there be rock in the borrow?

To ignore or even slight these soils considerations as time or money wasters is to bypass a cheap form of bidding insurance. Armed with a suitable soils study, a contractor might well decide the prospective job hazards are too many and avoid the needless expense of working up a bid. In any event he will be better informed about what to include for proper equipment and contingencies. If he is then not low bidder, he can take consolation in knowing he stands to lose neither his shirt nor his reputation on a fiasco. An owning agency also gains from bidders' soils investigations because it saves legalities and pa-

perwork on "extra" items later.

It is not necessary to be minutely exact in pre-bid reconnaissance. It is only important for a contractor to know the job area thoroughly exact in pre-bid reconnaissance. Agency will have made accurate subsurface studies for planning and for adequate design long before the call for bids. But a letting agency sometimes will not give out complete investigation reports prior to the contract signing. Some prefer to release only "sufficient or necessary" information to prospective bidders.

It is not too difficult to get the required pre-bid information. Look at air photos and U.S. Coast and Geodetic Survey or Agricultural Soil Survey maps. Examine geological and drill-boring logs. Fly over the area. And walk it on foot taking samples or making geophysical tests.

In most cases the contractor's own engineering personnel will be able to interpret the findings of early reconnaissance and come up with profitable recommendations. But on a job of any real size, bring in a soils engineer.

Aerial photographic interpretation (API), coupled with ground control, is invaluable for pre-bid reconnaissance. The entire route can be studied at once. API points out features of the terrain, whole-area drainage patterns, possible borrow locations, rock, and water. It can locate gravel sources, if any, for the upper layers of fills. Then you only need to make a qualitative ground check.

Do not confuse API with photogrammetry, which is making of contour maps from air-photos. Often days of searching for materials can be saved by a few hours of good API under the stereo machine of a qualified interpreter.

Large areas can be studied and probed rapidly and economically from the ground, or in some cases from the air, by any one of several geophysical methods: magnetic, gravity, electrical, seismic, or radioactive. Although all can be employed by the contractor in some way or other, the only method of really practical use to him in locating the water table and bed rock over extended areas is the seismic method. Roughly, it consists in setting off a series of small controlled explosions at given points and times, then measuring the rebound of the sound waves from bed rock and/or water table.

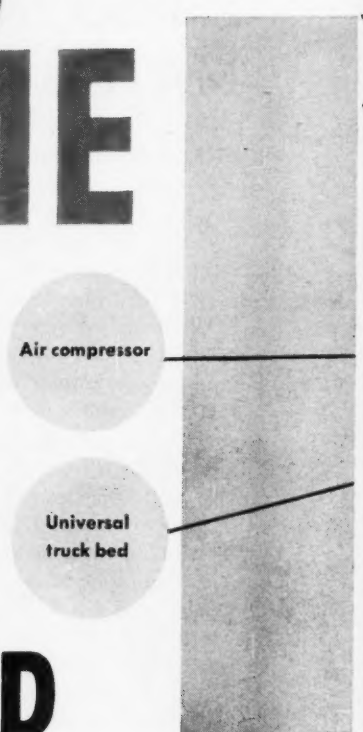
In extreme cases a boring rig may be used for at least a few drill holes, a boring log, and some deep samples. However, probing to this extent is expensive. The working contractor can fulfill his needs in ground sampling by carefully cutting soil chunks in good size, wrapping them in Saran Wrap or aluminum foil to preserve the natural moisture, and carrying them back to the laboratory in a closed coffee tin for further study.

A contractor's soil reconnaissance field kit should contain a pocket penetrometer-tool and a hand piston sampler. These should be accompanied by an auger or other device for recovering soil samples from reasonable depths, airtight containers to receive the samples, and a geologists pick, hammer, and small crowbar.

continued on page 194

"Speed Up" with an Alemite

LESS DOWNTIME MORE JOB TIME FOR YOUR SPREAD

A diagram showing a vertical rectangular unit representing the Alemite Portable Service Station. Two circles are positioned to the left of the unit. The top circle is labeled "Air compressor" and has a line connecting it to a horizontal slot near the top of the unit. The bottom circle is labeled "Universal truck bed" and has a line connecting it to a horizontal slot near the bottom of the unit.

Air compressor

Universal
truck bed

BRINGS POWER LUBRICATION DIRECTLY TO EQUIPMENT...ON THE JOB!

When an Alemite Portable Service Station rolls up to your equipment on the job, it delivers fast, one-stop service that gives you two important benefits.

You eliminate costly downtime and get more working minutes per hour from every unit. And you reduce chances of costly bearing failure because your spread gets proper maintenance at regular intervals.

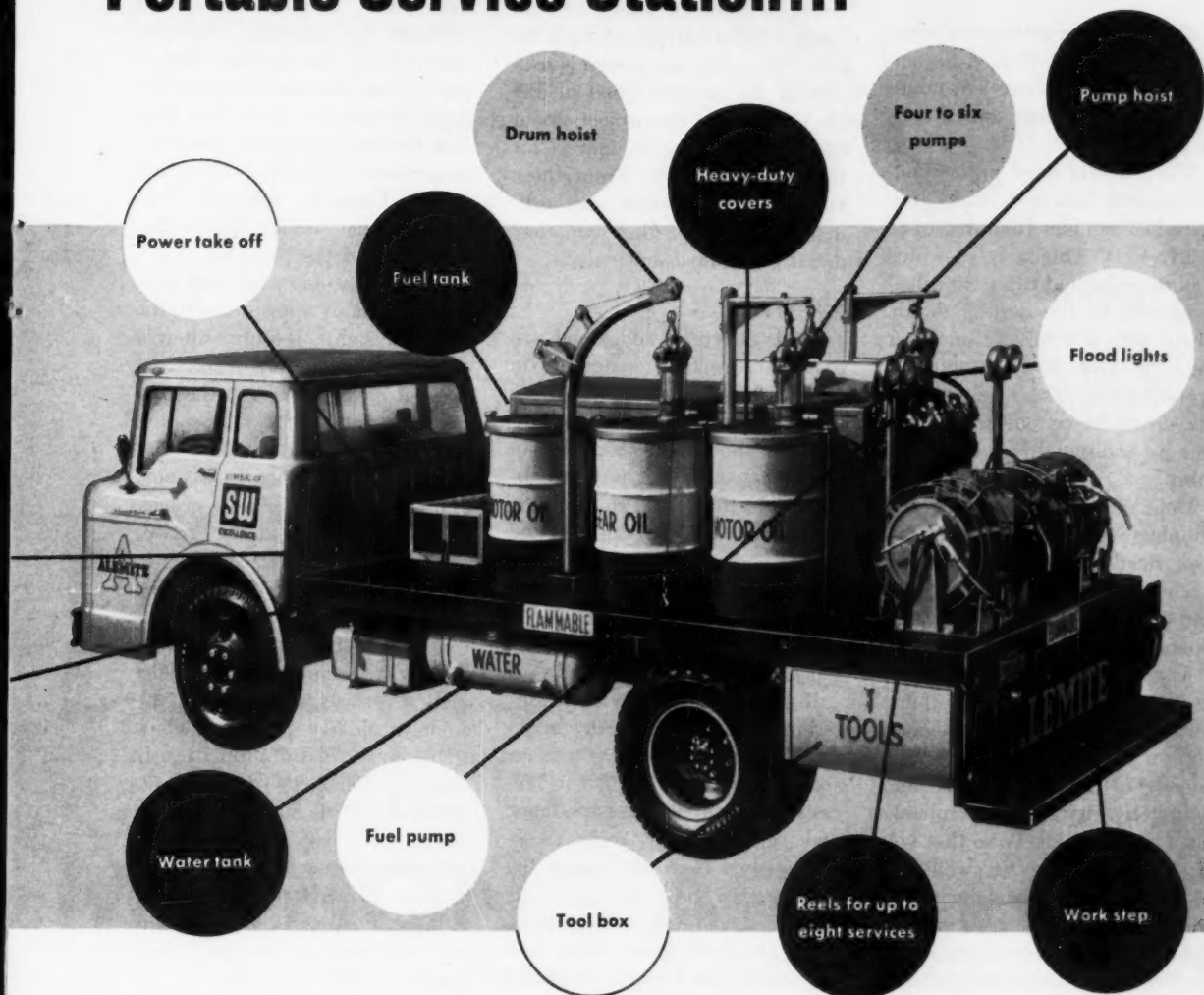
Alemite Portable Service Stations can be

tailor-made according to the size of your operation and types of equipment to be serviced, operating conditions, and drum size used. Service equipment can be skid-mounted, or (as shown above) permanently mounted on a truck bed.

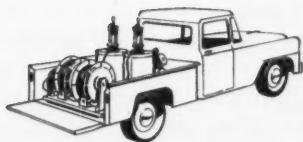
These efficient service rigs can be equipped to provide complete lubrication . . . to handle water service . . . and to furnish air for inflating tires, for jet cleaning, and for paint spraying.

Let Alemite bring you important savings in time, money, and equipment! Write for free bulletin completely describing Alemite Portable Service Stations and equipment.

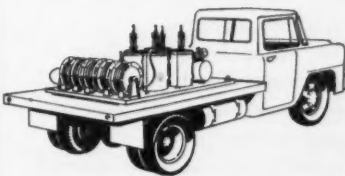
Portable Service Station...



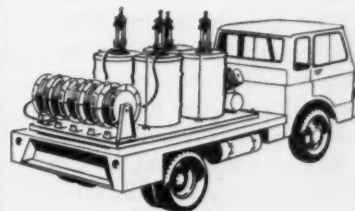
THREE SKID-MOUNTED ALEMITE PORTABLE SERVICE STATIONS SHOWN ARE EQUIPPED WITH THE FOLLOWING COMBINATIONS OF SERVICE EQUIPMENT:



2 pumps, 2 reels, 120-lb. drums



4 pumps, 5 reels, 120-lb. drums



4 pumps, 5 reels, 400-lb. drums



ALEMITE
DIVISION
STEWART-WARNER
CORPORATION

DEPT. P-50, 1850 DIVERSEY PARKWAY, CHICAGO 14, ILL.

EARTH COMPACTION . . .

continued from page 191

The pocket penetrometer, costing less than \$15, is used in conjunction with cohesive soil tables to classify clays and similar soils in place.

The 1-in.-dia hand piston sampler secures 1x15-in. relatively undisturbed samples from depths to nearly 40 ft. This sampler, which is both probe and tube, is pushed or driven to the desired depth. Then, with a $\frac{1}{4}$ turn of an inner rod, the tube is filled and the probe locked. The whole assembly is withdrawn, and the sample can be transported in the same tube.

Detailed information on soil sampling is contained in the American Road Builders Association's Technical Bulletin No. 107 (\$1) and the Highway Research Board's Special Report 44 (80¢).

Knowledge of the soil type and its behavior will help determine compaction equipment selection and an operations program. The density of the soil in place and desired density of soil in embankments must be known so that volume and shrinkage (or swell) can be computed. Embankment construction control is based on soil density, water content, and compactive effort. To be sure that sufficient soil is placed in the fill, compaction, settlement, and subsidence should be predicted. But the last two should be furnished the contractor by the consulting engineer.

Soil characteristics also determine the cross-section of the embankment. This may have been done in design. But if the contractor substitutes different material for economic reasons, he also must be able to answer the questions: On how steep a slope will this soil remain stable? Is this material subject to slides? How much will it settle or swell? What are the erosion characteristics?

Erosion is an important factor in selecting the correct soil for side slopes and drainage ditches.

Much improvement of available material can be achieved through skillful blending of several soils.

The cost of an adequate subsurface investigation and study for use in planning and design is usually in the neighborhood of 1% the total cost of the project; about % for taking samples, and % for testing and report. From these figures the contractor may estimate the cost of this own, less detailed reconnaissance study.

Soil Types

Steel, concrete, and wood are easy construction materials to work with because they are of homogeneous, uniform composition. As such, their behavior can be predicted. Soil is just the opposite. In its natural state, soil is rarely uniform and can only be studied and worked by comparison with a similar type with which previous experience has been gained. To accomplish this, soil types first must be classified.

Rock was formed by three different means. Igneous rocks solidified from molten masses; sedimentary rocks formed in layers settling out of water solutions; and metamorphic rocks were transformed from material of the first two by heat and pressure.

Time, chemistry, and weather have attacked these rocks and have worn much of their surfaces down into soft "seas" of minute particles—the soil. These have been well mixed by glaciers, wind, water, gravity, and man. Decaying plant and animal matter have further complicated the soil picture by contributing organic material to the mixture.

The embankment builder is only concerned with five basic soil types: gravel, sand, silt, clay and organic matter.

Gravel is any rock-like material down to $\frac{1}{4}$ in. in particle diameter. But the larger particles are called stones, and those single particles larger than 10 in. are boulders.

Sand has mineral grains below $\frac{1}{4}$ in. down to 0.002 in. It could be coarse or fine sand, but it feels grainy and its strength is not af-

fectured by wetting. In general, it is called granular material because the grains have little attraction for each other. This leaves the stuff with no dry strength. Granular material can be vibrated into a dense form because the particles jiggle themselves about until they find the most compact grain arrangement, thereby minimizing voids. Granular material does have internal friction due to this "stacking" of the particles.

Silt is very fine sand that presents no grainy appearance to the touch or sight. If pure, silt will settle out of muddy water and leave it clear. Although the particle size is 0.002 in. and smaller, it is still granular material. But silt compacts very poorly, has next to no dry strength because of lack of cohesion between the grains, and is easily pulverized when in dry lumps. All granular material permits ready passage of groundwater and is, therefore, permeable.

Clay is the finest size soil material. It consists of microscopic colloidal scale-like particles, which give clay its plastic properties. In water, clay colloids remain in suspension and do not settle as silt does. Clay particles have much attraction for each other, and thus clay is a cohesive material. It has a high dry strength, low erodibility, good workability, and it compacts readily. But clay has no internal friction and is therefore subject to slides. It also is susceptible to shrinkage and/or swelling. It is low in permeability since water has difficulty flowing through the tight particle pattern held by the surface tension bond of the natural moisture.

Organic matter is partly decomposed vegetable or other previously living matter. It appears as peats, organic silts, or organic clays. They are generally soft, odorous on heating, or appear fibrous, black, or very dark brown. Organic materials should not be considered for fill material since they will decompose further, leaving voids. They also reduce plasticity and dry strength.

continued on page 198

Fastest Growing Line in The Industry



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Across the country . . . around the world . . . hundreds of bridges are and will be going up in the '60s with the help of Marion bridge cranes. Here are just a few of the reasons why contractors everywhere are turning to Marions for such exacting work; why you can expect your bridge building profits to shoot skyward when you use a Marion.


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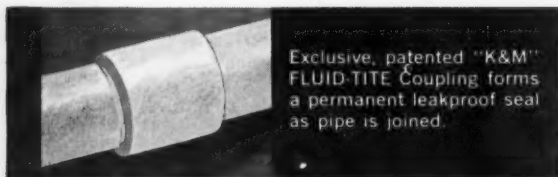
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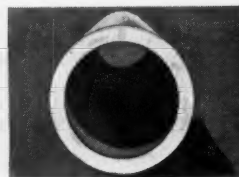
Get full facts on the Marion bridge crane story. Write for your copy of Bulletin No. 458 today.

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"K&M" Asbestos-Cement Sewer Pipe helps you provide the best sewer service available . . . with tax savings that go on year after year.

This thrifty pipe is infiltration-proof, even when external water pressure is 25 psi. Prevents your sewer system from reaching full capacity years ahead of schedule, due to water infiltration. **"K&M" Asbestos-Cement Sewer Pipe**, with exclusive, patented **FLUID-TITE Coupling**, forms a permanently tight seal.

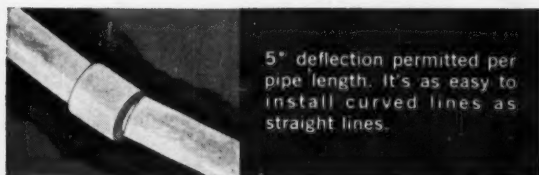
In planning your system, you can build on flatter grades with **"K&M" Asbestos-Cement Sewer Pipe**. Need fewer lift stations. The permanently smooth bore of **"K&M" Asbestos-**

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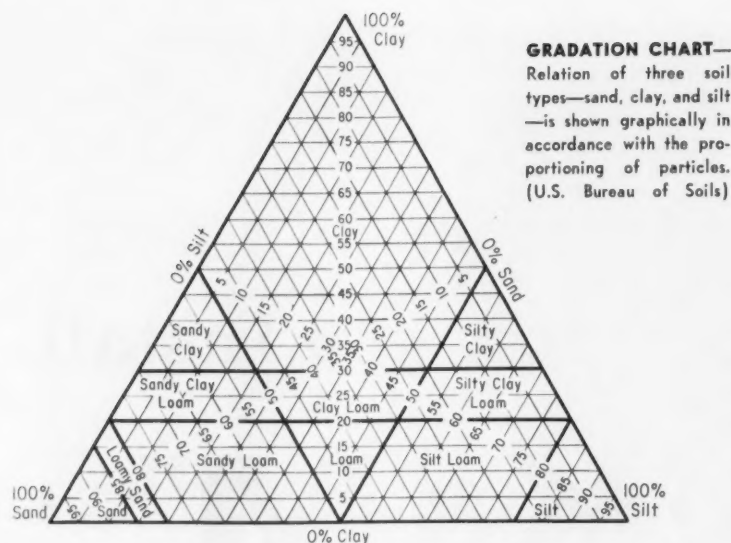
Write today for more detailed and illustrated information on hardy **"K&M" Asbestos-Cement Sewer Pipe**. Learn why thousands of progressive communities have turned to this durable quality pipe. Write to: Keasbey & Mattison Company, Ambler, Pa., Dept. P-1450.

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EARTH COMPACTION . . . continued from page 194

When a cohesive soil is in the range of optimum moisture it is plastic, pliable, and compacts best. When it becomes too wet, it becomes soupy, weak, and unworkable. When it becomes too dry, it may compact well; but after a rain it will soak up water and thereby lose strength, possibly flowing out or sliding.

Generally, the soil types are found in nature in some mixed proportions. Care should be taken, in placing fill embankments, to make the most advantageous use of soil properties.

The composition of unusual or peculiar soils causes problems in applying "standard" compaction specifications. Soils high in magnetite and garnet composition are one example. The high specific gravity of these components may call for unusually high compacted densities in order to achieve a base of adequate strength.

Other soil minerals which may behave peculiarly under field conditions of compaction are the zeolite minerals, sands derived from volcanic products, diatomaceous soils, and soils containing expansive clay minerals.

Included in the "problem" soils are the extremely well-graded glacial tills containing all components from fine gravel to colloidal clay. These soils have a critical

optimum moisture content, where the laboratory optimum moisture content is at about the upper extreme of the field optimum.

As little as 1% of moisture above laboratory optimum will cause excessive pumping and heaving under field compaction. Three-foot waves under hauling-equipment wheel loads are not uncommon under these conditions. When adequately dried to field optimum (generally less than their natural content) these soils make excellent embankment materials. However, their relatively high plastic soil content requires special effort in field drying. Such soils were encountered on the Main Turnpike and the Massachusetts Turnpike.

Consolidation, shrinkage, and swell are important things to consider when selecting soil for a compacted fill. When any granular or cohesive material dries to a great extent, the departing moisture causes a decrease in the total volume. This shrinkage can result in damage to the designed volume and to the supported structure.

When a clay is loaded, the imposed weight will, over a long period, force the particles closer together and squeeze out the moisture from the voids between them. This time-rate-of-decrease in volume due to imposed load is

consolidation. The elastic properties of clay are such that, when the load is removed, the material will rebound almost to its initial state. It does not matter how long the load has been imposed.

Some clays take on moisture quite readily. Then they swell due to this increased volume in the void spaces and the resulting internal pressure built up between the particles. Swelling can cause much trouble, and clay types should be carefully checked to be sure this will not occur once the embankment is in place.

The basis for engineering control of compacted fill was set forth by R. R. Proctor, a field engineer for Los Angeles' Department of Water and Power. In 1933 he proved the relationship between earthwork contracting and soil mechanics that results in economic, efficient, stable, water-tight structures. The key is moisture.

Optimum moisture content is the amount of water needed in a given soil for compaction to maximum density. In any soil, between the grains there are spaces filled with air and water. Insufficient water will not lubricate the grains enough to let them slide into their tightest arrangement. It also leaves voids containing air. Too much water destroys the frictional bond between particles and causes plastic flow.

There is a range of water contents where satisfactory compaction may appear to be reached but actually is not. Here's why: The compaction of a soil at low moisture content may result in a hard, firm fill having practically no plasticity. It will not spring under rolling, and will offer extremely high resistance to the Proctor needle test, which is a measure of relative density.

Soils that are well saturated will not support the rolling equipment in extreme cases. Soils on the wet side of optimum will offer only slight resistance to the Proctor penetrometer needle, which would indicate great plasticity.

continued on page 204

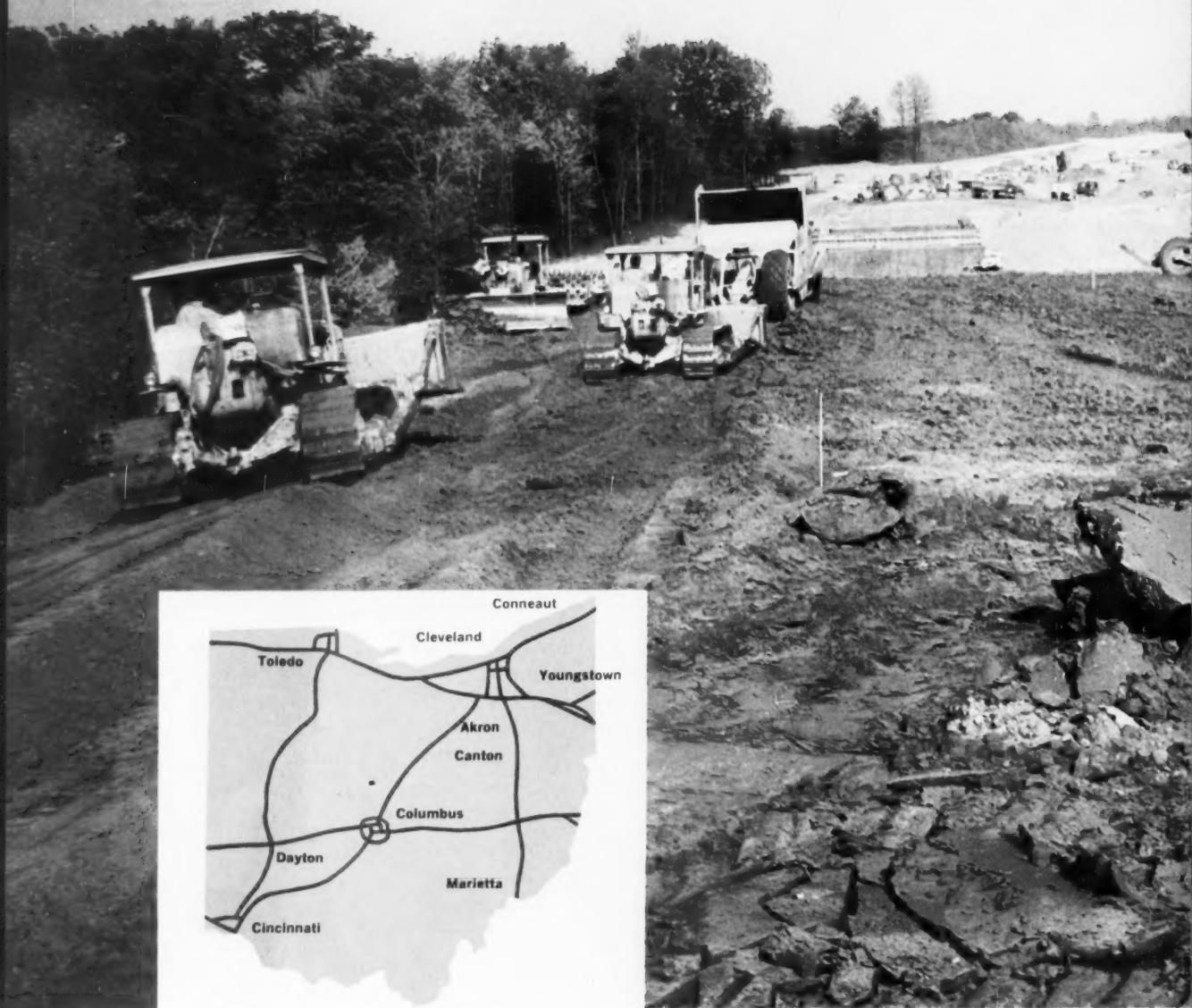


C. F. Replogle Construction Company moved 2,000,000 yds. of earth on its section of the Ohio Freeway, much of it at a rate of 100,000 yds. a day.

On the new Ohio Freeway...

In a duel with time and weather, 3 contractors report
GULF MAKES THINGS RUN BETTER!

In 1972, the State of Ohio will be crisscrossed by a coordinated network of seven interstate high-speed freeways. The new \$2.3 billion system will put every town, farm and factory in Ohio just a few hours away from ocean-going shipping at Lake Erie ports. Among the leading contractors working on the 326-mile leg between Cincinnati and Conneaut are the three whose equipment is pictured on these pages. ▶



When completed, the new Interstate Highway network will link Ohio's principal towns and cities with each other, with Lake Erie ports, and with the thruway systems of adjoining states.

The land that reaches northeast from Columbus, Ohio, toward Cleveland is deceptively flat, but its crust of clay and rock and sliding sand can be nerve-wracking to construction crews. Especially in the fall, when weeks of rain pound the mud into glistening muck. Then the dozers bog down, the tracks slip and spin, the wheels stop turning, and the muddy men stand in the slick brown sea and silently shake their heads. But the clock never stops. The days and the weeks tick off, and the completion date gets closer and closer.

Back on schedule after four-month delay

ALLEGHENY CONTRACTING INDUSTRIES of Pittsburgh had to suspend operations for four consecutive months

on the Cincinnati to Conneaut Freeway. Storm after storm, followed by biting cold, made the earth unworkable. When work was resumed, completion date for their 4.37 miles of four-lane highway was only six months away. A lot of lost time had to be made up. Allegheny took every precaution against downtime.

Vigilant preventive maintenance, along with clean-burning Gulf fuels and clean-working Gulf oils and greases, kept equipment humming. Downtime was almost eliminated, and the equipment set excellent performance records. Engines ran clean with maximum power output. Maintenance costs were held down. And in spite of the weather jinx, Allegheny Contracting Industries got the project back on schedule.



Allegheny Contracting Industries give a large share of credit to Gulf products and service for keeping equipment operating at top performance on a tight schedule.

Keeping equipment at 95% availability . . . every day

C. F. REPGLE CONSTRUCTION COMPANY, of Circleville, Ohio, set an earthmoving pace of 100,000 yards a day. Rolling their big MRS scrapers at more than 95% availability, Repogle took on a 3-mile section of the Cincinnati to Conneaut Freeway near Bellesville-Mansfield, Ohio. Their contract called for moving some 2,000,000 yards of earth, paving, and constructing 11 bridges. In spite of foul weather, earth-moving was completed on schedule. Much of the credit for work progress and minimum downtime goes to clean-burning Gulf fuels, clean-working Gulf lubricants and on-the-job Gulf service.

"We know our engines run clean on Gulf diesel fuel," says Charles Thompson, Operations Manager, "because we have no injector trouble. This pays off . . . keeps our equipment available for work 95% of the time."

Dean Shellhouse, Superintendent of Maintenance, adds, "We use 3,000,000 gallons of Gulf fuel a year, and have no problems with gum, sludge or sulfur deposits. A first line fuel is not expensive when you consider freedom from breakdowns and resulting costs."

Repogle also uses Gulf Super Duty Motor Oil, Gulflex A grease, Gulf Multi-Purpose Gear Lubricant, Gulf Harmony[®] oil, and Good Gulf[®] gasoline.



The 20-hour work day

BRUNS COAL COMPANY, Zanesville, Ohio, tackled the project of clearing, grading, drainage, paving, landscaping and bridge building on a 6-mile section of the Cincinnati to Conneaut route. The schedule was tight, the going tough. Dozers, scrapers, and graders gouged the earth into road beds. Trucks hauled more than 2,000,000 cubic yards of earth. Equipment ran 20 hours a day, six days a week—building 2¼ miles of ramps and interchanges, pouring over 129,000 square yards of 10-inch reinforced concrete pavement.

To keep Bruns equipment on the move, Gulf lived with the job. All Bruns heavy-duty powered machinery operated on clean, top-power Gulf fuels, and functioned smoothly on Gulf oils and greases. Few mechanical delays. Minimum maintenance costs.

Effective preventive maintenance of Bruns equipment included scheduled lubrication with Gulf heavy-duty oils and greases.

Bruns Coal Company executives discuss fuel and lube requirements with Gulf man-on-the-job. Left to right: Dennis Garwood, Chief Engineer; Lloyd Bruns, Vice President and Project Superintendent; Carl Bortles, Survey Chief; Frank Shindeldecker, General Superintendent; and William Stranko, Gulf Sales Representative.



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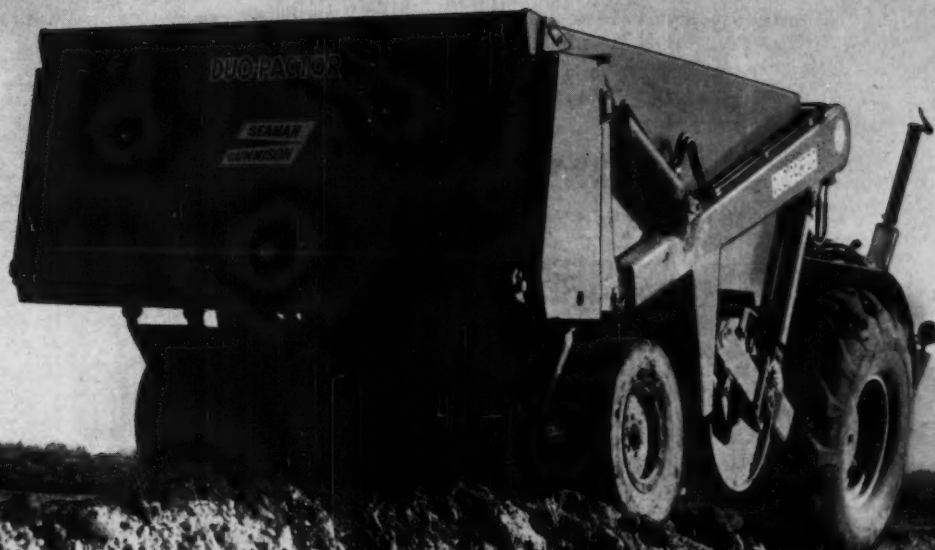
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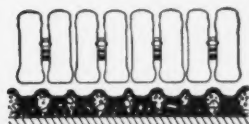
If you are thinking of COMPACTION, these DUO-PACTION facts may help you:

Contractors' cost records on scores of interstate, state, and county contracts reveal these amazing savings: Compared with previously used methods and equipment

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The closely spaced tires form densely compacted tracks with minimum material displacement.

Since density is a matter of compressive values, DUO-PACTION first of all provides greater compressive pressure than conventional pneumatic compactors, per ton of overall weight or pounds per wheel. Spring

mounting of tires in pairs applies uniform surface pressure over the entire rolling width. Small tire contact area eliminates bridging.

Second, close wheel spacing permits higher surface loading without material displacement, thus developing higher densities.

Third, you get selective load control—both rubber and steel rolls can be moved forward or backward, on-the-go, to vary loading.

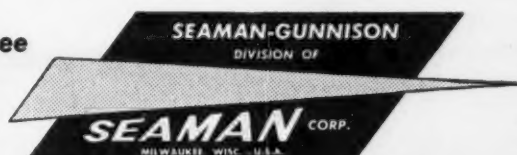
Finally, you can handle more types of compaction and surface rolling jobs with a DUO-PACTOR than with any other compactor ever before available. You slash your investment in compaction equipment to the bone! Write or 'phone today for name of your Seaman-Gunnison DUO-PACTOR Distributor.



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Standard Method of Test for

The Moisture-Density Relations of Soils Using A
5.5-lb. Rammer and A 12-in. Drop

AASHTO DESIGNATION: T 99-57

Scope

1. (a) These methods of test are intended for determining the relation between the moisture content and density of soils compacted in a mold of a given size with a 5.5 lb. rammer dropped from a height of 12 in. Four alternate procedures are provided as follows:

Method	Material	Section
Method A	4-in. mold; soil material	9 and 10
Method B	4-in. mold; soil material	9 and 10
Method C	4-in. mold; soil material	9 and 10
Method D	4-in. mold; soil material	9 and 10

(b) The method to be used should be indicated in the specifications for the material being tested. If no method is specified, the provisions of Method A shall govern.

Apparatus

2. (a) **Molds.**—The molds shall be cylindrical in shape, made of metal, and shall have the capacity and dimensions indicated in Items (1) and (2) below. They shall have a detachable collar assembly approximately 2½ in. in height, to permit preparation of compacted specimens of soil-water mixtures of the desired height and volume. The molds may be of the "split" type, consisting of two half-round sections, or a section of pipe split along one element, which can be securely locked in place to form a cylinder. The mold and collar assembly shall be so constructed that it can be fastened firmly to a detachable

base plate. Capacity and dimensions of the molds shall be as follows:

- (1) **4-in. Mold** having a capacity of 1/20 (0.050) cu. ft., with an internal diameter of 4.0 ± 0.005 in. and a height of 4.584 ± 0.005 in. (see Fig. 1).
- (2) **6-in. Mold** having a capacity of 1/12.33 (0.077) cu. ft., with an internal diameter of 6.0 ± 0.005 in. and a height of 4.584 ± 0.005 in. (see Fig. 2).

(b) **Rammer.**—A rammer of 5-in. diameter having a flat circular face and weighing 5.5 lb. The rammer shall be equipped with a suitable arrangement to control the height of drop to a free fall of 12 in. above the elevation of the soil.

(c) **Sample Extruder (optional).**—A jack, lever, frame, or other device adapted for the purpose of extruding compacted specimens from the mold.

(d) **Balances.**—A balance or scale of at least 25-lb. capacity sensitive to 0.01 lb., and a balance of at least 1000-g capacity sensitive to 0.1 g.

(e) **Drying Oven.**—A thermostatically controlled drying oven capable of maintaining a temperature of 110 ± 5 C. (230 ± 9 F.) for drying moisture samples.

(f) **Straightedge.**—A steel straightedge 12 in. in length and having one beveled edge.

(g) **Sieves.**—2 in., ¾-in., and No. 4 (475-micron) sieves conforming to the requirements of the Specifications for Sieves for Testing Purposes (AASHTO Designation: M 93).

(h) **Mixing Tools.**—Miscellaneous tools such as mixing pan, spoon, trowel,

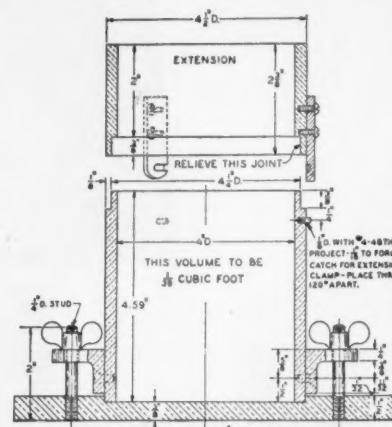


FIG. 1.—Cylindrical Mold, 4.0 in., for Soil Tests.

spatula, etc., or a suitable mechanical device for thoroughly mixing the sample of soil with increments of water.

METHOD A

Sample

3. (a) If the soil sample is damp when received from the field, dry it until it becomes friable under a trowel. Drying may be in air or by use of drying apparatus such that the temperature of the sample does not exceed 140 F. Then thoroughly break up the aggregations in such a manner as to avoid reducing the natural size of individual particles.

(b) Sieve an adequate quantity of the representative pulverized soil over the No. 4 (475-micron) sieve. Discard the

coarse material, if any, retained on the No. 4 sieve.

(c) Select a representative sample, weighing approximately 7 lb. or more, of the soil prepared as described in Paragraphs (a) and (b).

Procedure

4. (a) Thoroughly mix the selected representative sample with sufficient water to dampen it to approximately four percentage points below optimum moisture content.

(b) Form a specimen by compacting the prepared soil in the 4-in. mold (with collar attached) in three equal layers to give a total compacted depth of about 5 in. Compact each layer by 25 uni-

EARTH COMPACTION . . . continued from page 198

Soil Tests

It is obvious that testing and controls are vital at this point and cannot safely or economically be overlooked. This is the only way to determine which soil at hand is usable, how it is to be used, and if it is being used to its best advantage. No savings of time or money will result in by-passing controls.

There is an economic balance between the cost of construction and the cost of its control. There is a practical limit of economic field testing beyond which no basic improvement of the fill results.

Trial and error have no place in this business. Just as there are specifications for equipment, there are specific tests set forth for decisions on usable soils and for the control of densities and moistures in construction. The generally accepted standard, which is used by all states and by the Corps of Engineers, is AASHTO's T 99-57. (ASTM's D698-58T is, for all practical purposes, identical.)

Some time after the writing of T-99, to keep pace with heavier rolling equipment, the Proctor test was modified to accommodate results from greater compactive effort. This is AASHTO T 180-57 (similar to ASTM's D1557-58T).

very by approximately ten percentage points. The moisture content selected shall bracket the optimum moisture content, thus providing a sample which, when compacted, will increase in weight to the maximum density and then decrease as moisture content increases.

METHOD B

Sample

5. Select the representative sample in accordance with Section 3 (c), except that it shall weigh approximately 16 lb.

Procedure

6. Follow the same procedure as described for Method A in Section 4, except for the following: Form a specimen by compacting the prepared soil in the 6-in. mold (with collar attached) in three equal layers to give a total compacted depth of about 6 in., each layer being compacted by 56 uniformly distributed blows from the rammer. Multiply the weight of the compacted specimen and mold, minus the weight of the mold, by 1.333. Record the result as the wet weight per cubic foot of the compacted soil.

METHOD C

Sample

7. (a) If the soil sample is damp when received from the field, dry it until it becomes friable under a trowel. Drying may be in air or by use of drying apparatus such that the temperature of the sample does not exceed 140 F. Then thoroughly break up the aggregations in such a manner as to avoid reducing the natural size of individual particles.

(b) Sieve an adequate quantity of the representative pulverized soil over the No. 4 sieve. Discard the coarse material, if any, retained on the No. 4 sieve.

(c) Select a representative sample, weighing approximately 12 lb. or more, of the soil prepared as described in Paragraphs (a) and (b).

Procedure

8. (a) Thoroughly mix the selected representative sample with sufficient water to dampen it to approximately 4 percentage points below optimum moisture content.

(b) Form a specimen by compacting the prepared soil in the 6-in. mold (with collar attached) in three equal layers to give a total compacted depth of about 6 in. Compact each layer by 56 uniformly distributed blows from the rammer, dropping free from a height of 12 in. above the elevation of the soil when a sleeve-type rammer is used, or from 12 in. above the approximate elevation of each fully compacted layer when a stationary mounted type of rammer is used. During compaction, the mold shall rest on a uniform, rigid foundation, such as a provided by a cube of concrete weighing not less than 200 lb. Following compaction, remove the extension collar, and carefully trim the compacted soil even with the top of the mold by means of the straightedge. Holes developed in the surface by removal of coarse material shall be patched with smaller size material. Weigh the mold and moist soil. Multiply the weight of the compacted specimen and mold, minus the weight of the mold, by 20, and record the result as the wet weight per cubic foot of the compacted soil.

(c) Remove the material from the mold and slice vertically through the center. Take a representative sample of the material from one of the cut faces, weigh immediately, and dry in an oven at 110 ± 5 C. (230 ± 9 F.) for at least 12 hr., or to constant weight, to determine the moisture content. The moisture content sample shall weigh not less than 500 g.

(d) Thoroughly break up the remainder of the material until it will pass a No. 4 sieve and 90 percent of the soil aggregations will pass a No. 10 sieve as judged by eye. Add water in sufficient amounts to increase the moisture content of the soil sample by one or two percentage points, and repeat the above procedure for each increment of water added. Continue this series of determinations until there is either a decrease or no change in the wet weight

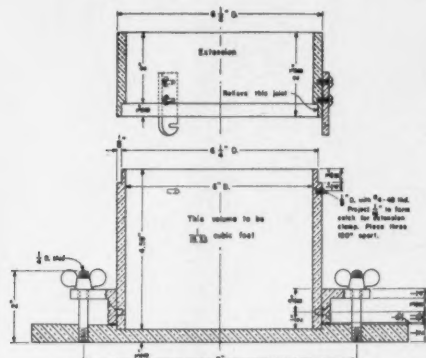


FIG. 2.—Cylindrical Mold, 6.0-in., for Soil Tests.

formly distributed blows from the rammer dropping free from a height of 12 in. above the elevation of the soil when a sleeve-type rammer is used, or from 12 in. above the approximate elevation of each finally compacted layer when a stationary mounted type of rammer is used. During compaction, the mold shall rest on a uniform, rigid foundation, such as provided by a cube of concrete weighing not less than 500 lb. Following compaction, remove the extension collar, carefully trim the compacted soil even with the top of the mold by means of the straightedge, and weigh. Multiply the weight of the compacted specimen and mold, minus the weight of the mold, by 30; and record the result as the wet weight per cubic foot of the compacted soil.

(c) Remove the material from the mold and slice vertically through the center. Take a representative sample of the material from one of the cut faces, weigh immediately, and dry in an oven

at $110 \pm 5^\circ\text{C}$. ($230 \pm 9^\circ\text{F}$.) for at least 12 hr., or to a constant weight to determine the moisture content. The moisture sample shall weigh not less than 100 g.

(d) Thoroughly break up the remainder of the material until it will pass a No. 4 sieve as judged by eye. Add water in sufficient amount to increase the moisture content of the soil sample by one or two percentage points, and repeat the above procedure for each increment of water added. Continue this series of determinations until there is either a decrease or no change in the wet weight per cubic foot of the compacted soil (Note).

Note.—This procedure has been found satisfactory in most cases. However, in instances where the soil material is fragile in character and will reduce considerably in grain size due to repeated compaction, and in cases where the soil is a heavy-textured clayey material into which it is difficult to incorporate water, a separate and new sample shall be used in each compaction test. In these cases, separate samples shall be thoroughly mixed with amounts of water sufficient to cause the moisture contents of the samples to

per cubic foot of the compacted soil (see Note, Section 4 (d)).

METHOD D

Sample

9. Select the representative sample in accordance with Section 7 (e) except that it shall weigh approximately 55 lb.

Procedure

10. Follow the same procedure as described for Method C in Section 8, except for the following: Form a specimen by compacting the prepared soil in the 6-in. mold (with collar attached) in three equal layers to give a total compacted depth of about 5 in., each layer being compacted by 56 uniformly distributed blows from the rammer. Multiply the weight of the compacted specimen and mold, minus the weight of the mold, by 15.33. Record the result as the wet weight per cubic foot of the compacted soil.

CALCULATIONS AND REPORT

11. Calculate the moisture content and the dry weight of the soil as compacted for each trial, as follows:

$$w = \frac{A - B}{B} \times 100$$

and

$$W = \frac{B}{0.95} \times 150$$

where:

w = percentage of moisture in the specimen.
 A = weight of specimen and wet soil.
 B = weight of specimen and dry soil.

C = weight of specimen.
 W = dry weight, in pounds per cubic foot of compacted soil and
 W = wet weight, in pounds per cubic foot of compacted soil.

Moisture-Density Relationship

12. (a) The calculations in Section 11 shall be made to determine the moisture content and corresponding oven-dry weight (density) for each of the compacted soil samples. The oven-dry weights per cubic foot (densities) of the soil shall be plotted as ordinates and corresponding moisture contents as abscissas.

(b) Optimum Moisture Content.—When the densities and corresponding moisture contents for the soil have been determined and plotted as indicated in Paragraph (a), it will be found that by connecting the plotted points with a smooth line, a curve is produced. The moisture content corresponding to the peak of the curve shall be termed the "optimum moisture content" of the soil under the above compaction.

(c) Maximum Density.—The oven-dry weight per cubic foot of the soil at optimum moisture content shall be termed "maximum density" under the above compaction.

Report

13. The report shall include the following:

- (1) The method used (Method A, B, C, or D).
- (2) The optimum moisture content,
- (3) The maximum density, and
- (4) In Methods C and D indicate if the material retained on the $\frac{1}{8}$ -in. sieve was removed or replaced.

The contractor should become familiar with these specifications. It is only by complying strictly with them that finished embankment will be accepted by the owner's engineer.

The specification shows the way to make trials at various combinations of soil particles and moisture contents in order to arrive at a maximum density under a given, economical compactive effort. When this optimum moisture and soil mixture is thus determined, it is used in the field under the compactors. If field compaction is done carefully, the result should duplicate that obtained in the test mold.

This is where the Proctor needle penetrometer is used to measure relative densities. The needle is pushed into the soil both in the mold and in the compacted embankment. If the resistances to penetration are reasonably close in both cases, then the desired results have been achieved. If they are not, then the field result and procedures must be altered.

The Proctor penetrometer measures resistance to penetration by a spring in the tool. Another type, developed by the Tennessee Valley Authority, uses a hydraulic cylinder instead of a spring. And the Corps of Engineers has an instrument that measures soil resistance by deformation of a proving ring. All of these devices are available from apparatus sup-

Standard Method of Test for

The Moisture-Density Relations of Soils Using A 10-lb. Rammer and an 18 in. Drop

AASHTO DESIGNATION: T 99-57

Range

1. (a) These methods of test are intended for determining the relation between the moisture content and density of soils when compacted in a mold of a given size with a 10-lb. rammer dropped from a height of 18 in. Four methods, A, B, C, and D, are provided as follows:

Method A.—A 4-in. mold; soil material passing a No. 4 (75- μ mm) sieve 3 and 4	
Method B.—A 4-in. mold; soil material passing a No. 4 (75- μ mm) sieve 3 and 4	
Method C.—A 4-in. mold; soil material passing a No. 4 (75- μ mm) sieve 3 and 4	
Method D.—A 4-in. mold; soil material passing a No. 4 (75- μ mm) sieve 3 and 4	

(b) The method to be used should be indicated in the specifications for the material being tested. If no method is specified, the provisions of Method A shall govern.

Sections 2 through 15 shall be the same as those of AASHTO Method T 99 for the moisture-density relations of soils using a 5.5-lb. rammer and a 15-in. drop, except that wherever 5.5 lb. appears, 10 lb. shall be substituted, wherever 15 in. shall be substituted, wherever 18 in. shall be substituted, and wherever three equal layers appears, five equal layers shall be substituted in each of the A, B, C, and D methods.

TEST SPECIFICATIONS—Standard methods of determining moisture-density relations of soils are given in AASHTO's "Highway Materials", Part III. Almost all states require one or the other for testing fills.

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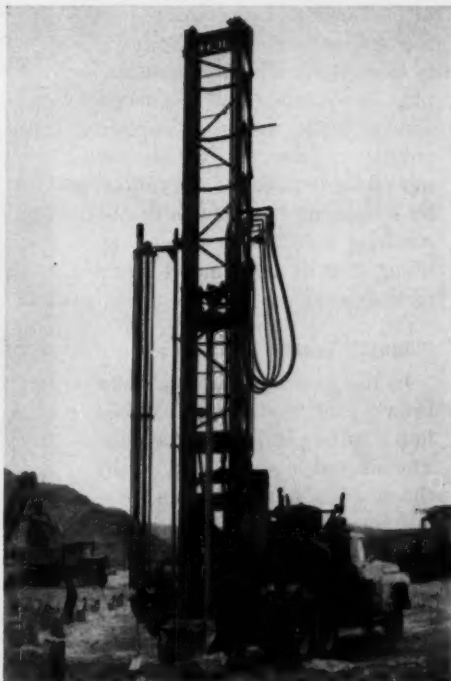
CP REICHdrills, for example, are all-hydraulic, top-drive rotary drilling rigs, mounted on trucks or crawlers. All hydraulic means infinitely variable rotation speed and down-pressures to insure the operator the right combination of speed and pressure for every formation. Safety Torque Release minimizes drill breakage. Capacities to 16" hole diameter and 90,000 lbs. down-pressure.

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EARTH COMPACTION . . .

continued from page 205

ply houses, as are molds, hammers, scales, and other accessories.

Also available is a Wilson miniature compaction apparatus that can be used to curtail, but not eliminate, the standard compaction tests. It saves time, energy, and material and is especially useful when hundreds of compaction tests are to be run. However, this is a short cut only, and occasional check points should be run with standard apparatus to see if the miniature test keeps correlation.

Another relative compaction test is Porter's California Bearing Ratio (CBR) test that uses 6-in.-dia molds and the modified hammer called for in T 180. Full details of this and its application are given in ARBA's Bulletin 107.


In-place density determinations of residual soils and determination of the density of a compacted fill are absolutely necessary, in order to know if the fill will remain stable. To measure these it is necessary to know the exact in-place volume of the soil sample removed for test. This is determined by measuring the volume of the resulting hole in the ground by filling it with a contained liquid or with sand.

"Liquid" Tests

In the liquid procedure, water from a calibrated vessel is forced into a rubber balloon in the hole. The amount of water used equals the sample's in-place volume. Several somewhat similar devices are available for this job, but all have a rather high balloon mortality rate:

The Dens-o-meter (D. G. Parrott & Sons, Olympia, Wash.) can be used in large holes in all types of soil and is comparatively simple to operate. However, it is cumbersome.

The Volumeasure (Soiltest Inc., Chicago) comes in 1/20 and 1/13-cu-ft sizes. Light, compact, and simple to operate, its accuracy in small holes is good. But it is not



"LIQUID TEST"—To determine volume of soil removed from hole, operator pumps water into rubber balloon inserted in it. Gage measures volume of water in balloon.

too stable and requires effort to keep it standing and on the test.

The Series 200 Volumeter (Rainhart Co., Austin, Tex.) is light, portable, and simple for one man to operate. It can be stabilized comfortably while operating, and its single glass reading tube lessens chances of breakage.

The Iowa Engineering Experi-

ment Station, Ames, has developed the only practical, economical liquid device for making tests in horizontal holes. This, too, is light, portable, and not overly complicated. It is not on the market, but plans are available for those who wish to build their own.

"Sand" Tests

In the sand method, the hole from which the soil sample was removed is filled with measured dry sand of uniform known density. Advantages over liquid filling are that the test can not be lost due to balloon breakage (no balloon container is needed) and the test can be conducted in freezing weather. One disadvantage lies in the discomfort of working with sand in windy areas. Another is the necessity of lugging 100 lb of calibrated sand and several 1-gal jugs to the test site. Nevertheless, accuracy of a properly conducted sand-method test is unquestionable.

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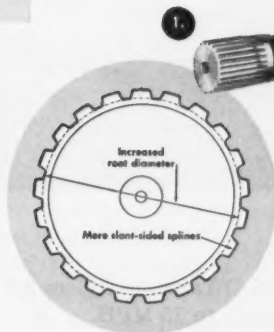
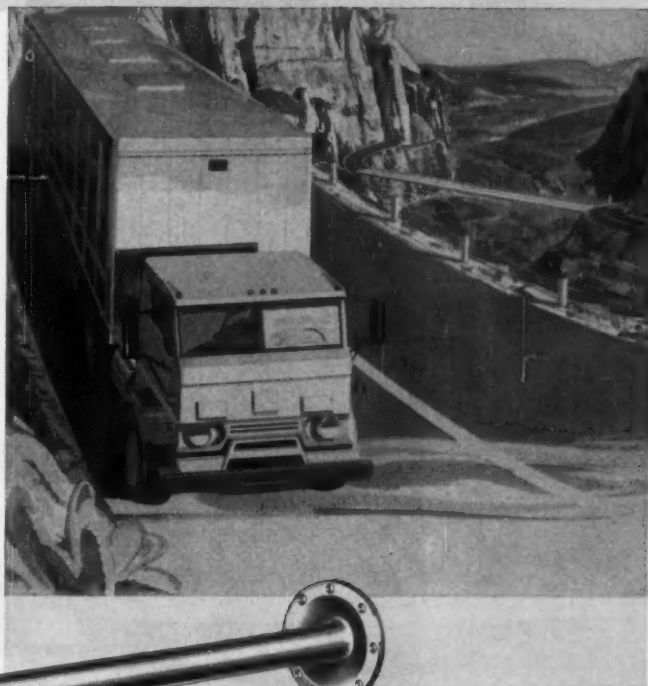


"SAND" TEST—Inverted funnel directs sand of known density from calibrated bucket into test hole, stops wind blowing it away. Amount of sand used equals hole's volume.

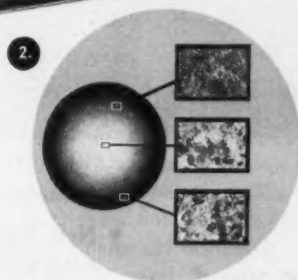
YOUR ROCKWELL-STANDARD AXLES ARE THE TOUGHEST MADE...

ONLY GENUINE TIMKEN-DETROIT® REPLACEMENT PARTS KEEP THEM THAT WAY!

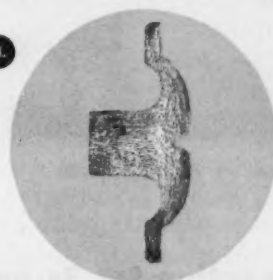
Whether they are made for original equipment or for replacement parts, Timken-Detroit Axle components always meet the same rigid standards of quality, performance and rugged durability. In every Timken-Detroit component, important extras are built in—extras that are not available with any so-called substitutes. For example, only a Torsion-Flow axle shaft replacement gives you all these important *original* equipment advantages:



1. More Slant-Sided Splines decrease individual spline load to prolong shaft life. Root diameter is increased for greater strength. Splines are enveloped by differential side gears to eliminate high stress areas.



2. Patented Heat Treating Process gives the axle shaft an extreme hardness on the outer surface which graduates to a tough, resilient inner core.



3. Torsion Flow Forging. Flange is integrally forged so grain structure of the shaft conforms to the shape of the flange. All torsional stresses are opposed by the grain flow for maximum resistance to cracking.

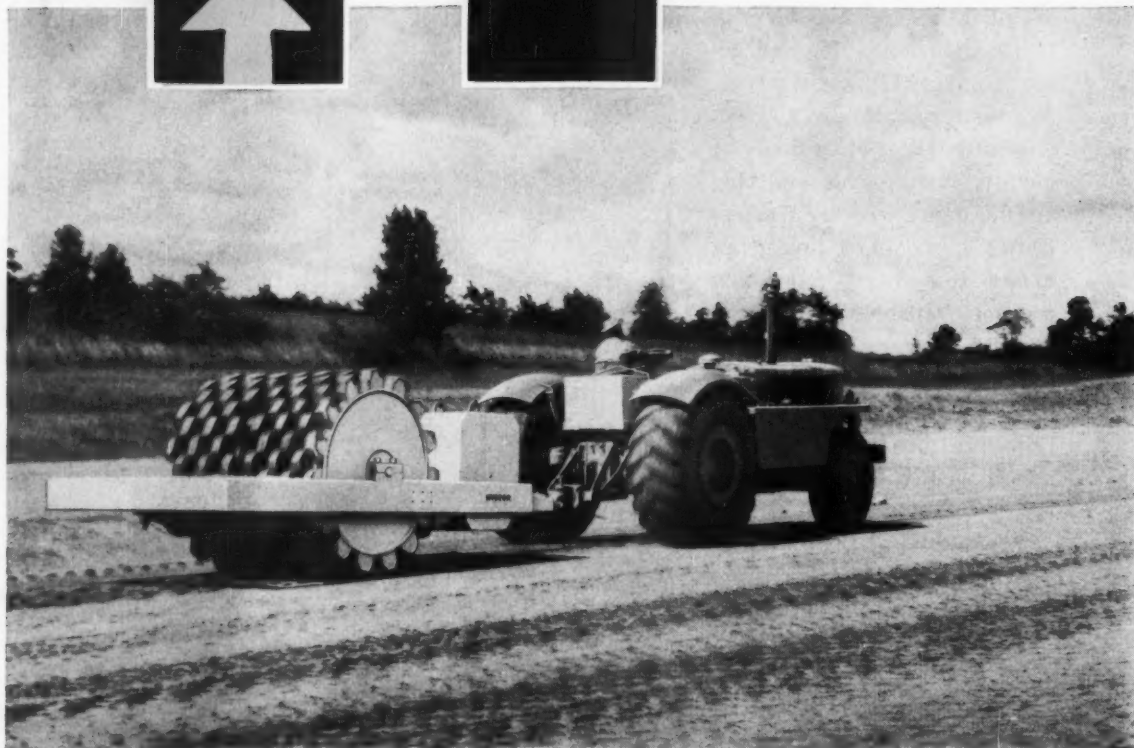
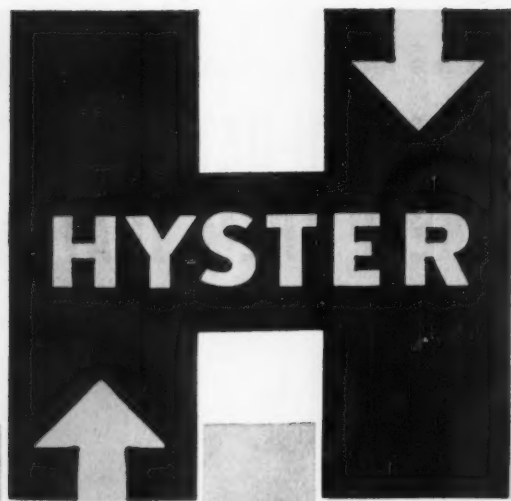
See your factory authorized vehicle dealer for all your replacement needs.

Products of...

ROCKWELL-STANDARD
CORPORATION



Transmission and Axle Division, Detroit 32, Michigan



Compaction for 3¢ per cubic yard

HYSTER® has it!

Contractors report:

- New Hyster Model D Tamping rollers get compaction at speeds to 15 MPH.
- High speed rolling cuts compaction costs to less than three cents per cubic yard.
- Large contact area of tamping feet—21 sq. in.—gives fast “walk out”!

Ask your Caterpillar-Hyster dealer for a demonstration soon.

Cat and Caterpillar are registered trademarks of Caterpillar Tractor Co.

TRACTOR EQUIPMENT DIVISION—Construction and logging equipment
 INDUSTRIAL TRUCK DIVISION—Lift trucks, mobile cranes, straddle carriers
 MARTIN TRAILER DIVISION—Heavy machinery hauling trailers
 INTERNATIONAL DIVISION—Overseas manufacturing, sales and service
 Factories: Portland, Oregon (Home Office) • Danville, Ill. • Peoria, Ill. • Kewanee, Ill. •
 Nijmegen, The Netherlands • Glasgow, Scotland • Sao Paulo, Brazil • Sydney, Australia (Licensee)



HYSTER COMPANY
 TRACTOR EQUIPMENT DIVISION
 P. O. Box 328 • Peoria, Illinois

EARTH COMPACTION . . .

continued

Companies making equipment for such density tests include C. A. Hogentogler & Co., Washington, D.C.; and Testlab Corp., Humboldt Mfg. Co., and Cenco Corp., all of Chicago. Most of these companies also offer tubes or molds that can be pressed into the soil to extract a sample of predetermined volume. ARBA's Bulletin 107 outlines these tests and tells ways to improvise apparatus to make them.

"Nuclear" Tests

Latest advance in soils testing is with radioactive materials. A new nuclear instrument capable of determining both density and moisture content during embankment compaction has been developed by the Michigan State Highway Department. The nuclear gage incorporates radium-D-beryllium in a stainless steel casing about 10 in. sq and 2 in. thick, which rests on the ground surface.

The device radiates gamma and neutron rays into the ground where they are partially absorbed and partially reflected. Reflected rays pass through Geiger-Muller tubes in the surface gage. Counts per minute are read directly on a reflected-ray counter gage and are related to density and moisture by calibration curves.

Advantages of the nuclear field test method are that it:

- (1) Is non-destructive; does not disturb in-situ soil structure.
- (2) Reduces the personal element that is involved in conventional test procedures, thereby increasing the consistency of density and moisture test results.
- (3) Provides a means of performing density tests on large-sized aggregate base courses and on frozen material, which are difficult to handle by other test methods.
- (4) Saves money, over the long pull, because of its greater speed and closer quality control. It also eliminates several conventional



"NUCLEAR" TEST —Density and moisture of the undisturbed soil are measured by radioactive isotopes. This newest soil-testing technique saves time, money, and manpower.

field test procedures requiring more trained personnel, and the new method creates less interference to the contractor's operations.

Disadvantage of nuclear tests is that they present a potential source of radiation exposure to the operator. However, individual radiation exposure can be maintained within the Atomic Energy Commission's safety levels by exercising ordinary caution. And AEC does not require licensing of the naturally occurring isotope of radium used in the Michigan device.

In conjunction with the Corps of Engineers, Nuclear-Chicago Corp. has developed a d/M-Gage which is portable, easy to operate, and relatively safe. It provides high accuracy and range in the measurement of soil moisture content or actual moisture-density relations. Like all precision instruments, it is delicate and high in initial cost.

Also useful to the contractor building embankments in cohesive

soils are piezometers. These pipe gages are placed in the fill as it is being built, to check movement and pressure of water in the pores of the soil. With this control, any dangerous condition of subsidence or swell can be detected in its formative stage and corrective measures taken.

To sum up, the process of compaction is a mechanical effort to get soil particles in as close an arrangement as possible, thereby minimizing the water and air in the voids. This way, soil is at maximum density. By a series of trials in the laboratory, some water content is reached that will give this condition. This is then duplicated in the field by compaction equipment, under strict control.

Next Month

The third article on earth compaction covers Machines—the compaction equipment itself. It describes various types available, details their features, and tells how to choose the machine best suited for particular compaction jobs.



*Paving the way
for tomorrow...*

Out of scenes such as this will come America's new superhighways—the sleek, smooth arteries so vital to trade and progress. “Crash” schedules, overloading, and a constant fight against rugged terrain show up any weakness in equipment with costly, time-consuming breakdowns.

On original equipment or as replacement parts, U.S. Axle Shafts keep the road-building “beasts of burden” on the job longer without axle shaft failure. Precision-made from finest alloy steels, they deliver “extra-duty” service . . . minimize costly replacements. Be sure your vehicles are equipped with U.S. Axle Shafts—world's finest!

U.S. Replacement Shafts for exact fit on every truck or off-the-road vehicle — see your Jobber.

U.S. “Custom-Engineered” Axle Shafts for original equipment — submit prints and specifications for quote.



THE U.S. AXLE COMPANY, INC.
Since 1920 • Pottstown, Pennsylvania

FREE! Write for valuable booklet: “Causes and Prevention of Axle Shaft Failure”



HOW Rock-Ribbed Payhauler®

**GIVES YOU
new load-
speeding
capacity!**



Of all rear-dumps in their size classes, only the International 65 and 95 Payhauler models give you the weight-shedding, strength-multiplying, rock-ribbed corrugated bodies! You trade 2½ tons of power-wasting dead weight for 3 bonus tons of capacity in the new 95 Payhauler!

Only the 65 and 95 Payhauler models have the power "plus" of the direct-start, high-torque, 4-cycle 6-cylinder International "817" Diesel engine! The "95" is powered by the 375-hp DT-817 turbocharged Diesel; the "65" has the same basic, high-output power plant: the naturally-aspirated 250-hp D-817!

Choose the "95" with power-shift torque-converter, or 9-speed air-shift transmission. The "65" comes with 10-speed constant-mesh transmission. Both models have the load-speeding safety of reserve-area braking and "one-hand," road-holding power steering! Above, it's the "65" shown storming up a 16% grade with 19-ton payload. Compare how Payhauler gradeability speeds the cycle over other haulers!

Add up the capacity-boosting advantages of Payhauler power-to-payload *punch*—super-speedy Payhauler loading, hauling and dumping. See how either the 19-ton "65" or 27-ton "95" can give you gear-faster climb-outs—and haul up to 14% faster than other rear-dumps! See your International Construction Equipment Distributor for a demonstration!

In minimum shovel time you heap-load the big-target Payhauler body. Rugged corrugations absorb rock-shock—give high resistance to wear and distortion from abrasion and impact! Torque-cushioning planetary-type axles let you apply full power to start and haul full loads!



Here's your 76-page cost and production estimating book—newest, most authentic and complete guide for estimating material-moving costs—and for selecting equipment combinations for top profits, anywhere! Yours for the asking from your International Construction Equipment Distributor!

Get 11-second Payhauler dumping with exclusive, action-speeding inverted hoist design! Simple, easy-to-operate up-and-down snubbing control prevents machine-punishing impact! Fast reverse, up to 7.1 mph., speeds spotting to dump or load!



International Construction Equipment

International Harvester Co.,
180 North Michigan Ave., Chicago 1, Illinois
A COMPLETE POWER PACKAGE



"Live track' power steering rock...SO WE KEEP OUR TD-25

—Asheville Contracting Company,

Shale and blue granite rock make up 85% of the 550,000-cu. yd. of roadway excavation on this contract —5.18 miles of Blue Ridge Parkway construction, for the United States Department of Interior.

That's why Asheville Contracting Company places maximum reliance on their "rock-movers' special": king-sized International crawler power! Where the going's too tough or job progress is too slow and costly with big clutch-steered crawlers, "Asheville's" new 230-hp TD-25 and two veteran TD-24's take over—and "run interference."

"International 'live track' power steering moves more dirt and rock," states M. H. Reighard, Superintendent of rock operations for "Asheville." "Therefore, we keep our TD-25 and TD-24's on trail-blazing and pioneering. The 'live track' feature keeps the blade in the material and makes steep work safer. TD-25 balance enables working 'almost straight up' on mountainous terrain."

Exclusive, years'-proved International Planet Power-steering gives you full-time live power on both tracks to handle full loads on turns as well as straightaways. Load-limiting "dead-track drag" is eliminated. And



moves more PIONEERING™


Asheville, No. Carolina



"live track" power-steering is combined with on-the-go, Hi-Lo power-shifting that lets you match power to load instantly, for full-speed cycles. You do away with time-wasting "gear-shift lag!"

New TD-25 seven-roller tracks are strength-matched to the full effort of the high-torque, 230-hp turbo-charged Diesel engine! The "25" is platformed on shock-resistant, double-box-beam track frames—smoothly carried on International's dual-protected Dura-Rollers, the track rollers that make 1,000-hr. lube intervals practical!

As standard equipment at no extra cost, the TD-25 gives you exclusive, combined Planet Power-steering and Hi-Lo on-the-go power-shifting. And you get this work-speeding design advantage in torque-converter or direct drive model. Here, Asheville's "25" operator is ready to "shift-up" to keep the load on the move.



Power-steer and power-shift the TD-25 with king-sized loads—around curves, upgrade, anywhere! Compare planet-powered "25" ability to deliver full-load capacity, full-time—to outearn other big rigs up to 50%—blading rock, benching, push-loading, mass-production dozing (where fast reverse and decelerator action count), ripping shale! Let your International Construction Equipment Distributor demonstrate!



Even with an enormous offset load of shot-rock there's no "bank-nosing," no sluing. The TD-25 operator simply operates the load-side track in high-speed range—the other track in low-speed range. Result: full-capacity, straight-ahead performance—the same as the "25" gives on benching, bank-cutting, or side-casting!

Here's your 76-page cost and production estimating book—newest, most authentic and complete guide for estimating material-moving costs—and for selecting equipment combinations for top profits, anywhere! Yours for the asking from your International Construction Equipment Distributor!



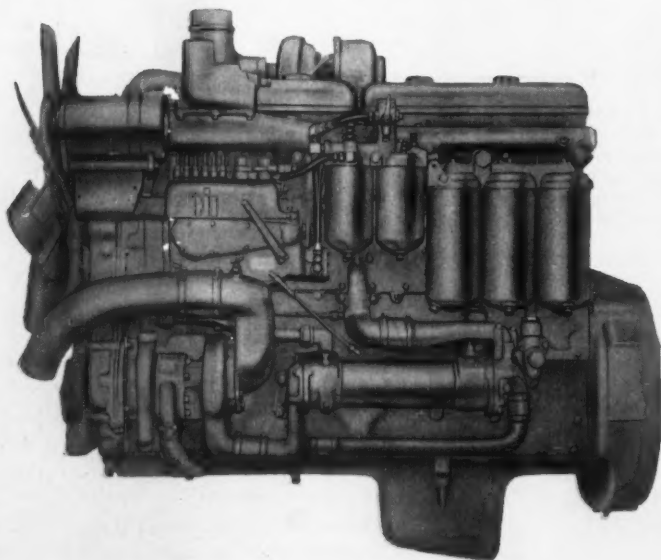
**International
Construction
Equipment**

International Harvester Co.,
180 North Michigan Ave., Chicago 1, Ill.
A COMPLETE POWER PACKAGE

How **BRAWN-BACKED** *Payscraper*[®] features give you stepped up...loading

From power plant to push-block, the 34-cu. yd. International 295 Payscraper gives you an exclusive combination of features that step up dirt-on-fill delivery! Compare quiet, big-capacity DT-817 Payscraper power. Try the advantage of up or down, on-the-go, Payscraper power-shifting that provides load-speeding *automatic* direct-drive lock-ups in second, third, and fourth gears! Measure *extra value features* like safe, effortless power-steering—that leaves “the steering feel in the steering wheel.” Note how exclusive torque-cushioning planetary drive axles add dependability to rough-and-tumble earthmoving! See how 122-inch bowl width speeds loading and unloading—adds control ease and stability, loaded or empty. Prove on your job that bonus performance “rides” the Payscraper bowl. Choose the 2-axle “295”; or 3-axle, 34-cu. yd. “495.” See your International Construction Equipment Distributor for a demonstration.

Payscraper power-to-payload punch tops all other rubber-tired rigs—because the fast-slugging, high-torque International DT-817 diesel is the Payscraper power plant! The 375-hp, turbocharged DT-817 gives you direct, push-button starting; all-altitude high-efficiency performance; power for top rim-pull to help speed all steps of the cycle; time-saving “no-lag” control power!



...roading

**...dirt-on-fill
capacity!**





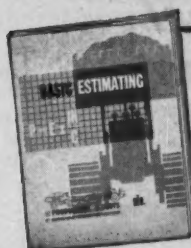
Even "dead" sand comes alive and "boils" fast into the Payscraper bowl. Every detail of Payscraper design aims at speeding the cycle, and staying available! The 21-inch diameter steel cross tube provides super load-bearing strength and resistance to impact. Bowl "back-bone," draft arms and side reinforcing members all are massive high-strength box-section steel weldments. "X"-member reinforcing maintains perfect push-frame alignment at all times. And the 4-speed, planetary-type, torque-converter power-shift transmission automatically adjusts torque and load to speed — to maintain full capacity!



You steer the 140,000-lb. loaded Payscraper almost as easily as a 3,600-lb. automobile! Payscraper gives the big control advantages of (1) exclusive International rack-and-pinion plus tandem pump steering system; and (2) 3-degree forward spindle pitch that improves scraper balance and prevents "nose downs" in high-speed turns. The 16-adjustment, bump-smothering seat builds operator confidence, too. And reach-easy power brakes, "control tower" vision, and flush deck safety help him deliver full Payscraper capacity, and take advantage of speeds up to 33.5 mph. He commands ample power and traction to pull directly out of 90-degree turns, even on soft fills!



The fast, positive-acting Payscraper ejector mechanism is powered by the International PTO-driven Cable Control Unit. One cable drum of this simple planetary system actuates the apron and ejector; the other drum positions the bowl to control spreading action. Apron lifts to a big 74-inch opening. Two ejector-plate pushing members apply dozer-like action to force out the whole 34-cu. yd. load cleanly. Action of six heavy-duty springs, stretched during ejection, positively powers the ejection mechanism's return!



Here's your 76-page cost and production estimating book—newest, most authentic and complete guide for estimating material-moving costs—and for selecting equipment combinations for top profits, anywhere! Yours for the asking from your International Construction Equipment Distributor!

International
Harvester Co.,
180 N. Michigan Ave.
Chicago 1, Illinois
A Complete
Power Package



International[®]
Construction
Equipment



You have the right to expect your International crawler to operate profitably under the most severe conditions...to deliver performance other equipment can't match. But when you've gotten maximum use from the original parts, replace them with the only parts that have original, built-in *fit-and-fitness*...genuine International parts!

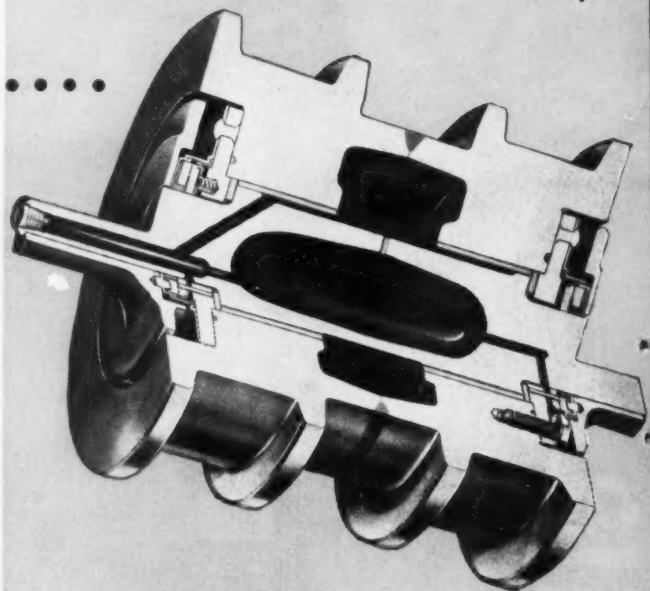
IH rollers, for instance....

International rollers are built to give maximum life with minimum maintenance. Bronze bushings provide larger bearing surfaces and greater load-carrying capacities. The extra thick shell puts more metal at the point of track chain contact, where it's needed. Lube capacity has been greatly increased to extend lubrication intervals. Self-contained oil seals and "O" rings assure perfect sealing, while a safety by-pass guards against over pressuring the seals. Best buy for an International tractor is an International roller—for performance exactly like the original.

International parts and service facilities are always nearby, with a network of 12 parts depots and more than 200 distributor outlets. You get the part you want, when you want it!



**Make
another
good
investment
get genuine IH
replacement parts**



***International[®]
Construction
Equipment***

International Harvester Co.,
180 North Michigan Ave., Chicago 1, Illinois
A COMPLETE POWER PACKAGE

Construction Men in the News . . .

Kaiser



R. W. FISHER, JR., is a newly elected vice president of Kaiser Engineers Overseas Corp. Previously, he served as a principal engineer with Kaiser Engineers.

Fisher's first overseas assignment is project manager on construction of a portland cement plant with a capacity of 100,000 ton per year for Mysore Cements Ltd., in India. The project, scheduled for completion by mid-1961, includes a processing plant, a warehouse and administration building, the development of a quarry, road and rail facilities, raw material storage facilities, cement storage silos, and a laboratory.

Fisher joined Kaiser in 1941 right after he obtained his civil engineering degree from the University of California at Berkeley. His first job was the direction of construction and maintenance of marine facilities, utilities, buildings, and ways and docks for a shipyard. He was a senior engineer with Kaiser in 1944 when he was commissioned as an officer in the Corps of Engineers. Shortly after his release from active duty, he rejoined the firm.

Fisher has worked on the design of expanded plant facilities for Kaiser Steel Corp. at Fontana, Calif. and Kaiser Aluminum & Chemical Corp. at Baton Rouge, La.; a new cement plant at Permanente, Calif., for Permanente Cement Co., and a deep water ammunition depot at Potrero Hills, Calif.

In 1956, Fisher was project engineer on an \$85.7-million alumina and caustic chlorine plant at Gramercy, La.

Heads Dam Job

CHARLES A. PETERSON, formerly an assistant project manager for Kaiser Engineers, is the new project manager for the \$8.8-million Howard A. Hanson Dam project in Washington being constructed for the Corps of Engineers. Henry J. Kaiser Co. and Raymond International, Inc. are joint venturers, with Kaiser as sponsor.

Peterson is a civil engineering graduate of Michigan State University. He has a background of 10 yr in the heavy construction field, the last five with Kaiser.

H. E. CHRISTMAN, formerly project manager at Hanson Dam, is returning to company headquarters in Oakland to assume new duties in connection with the company's overseas construction.

Burns and Roe

JOHN B. KELLEY is the newly appointed assistant to the executive vice president of Burns and Roe, Inc., of New York City. He will coordinate construction for the engineering and construction firm.

Previously, Kelley was a project manager and assistant to the director of the defense and aeronautical facilities division. He participated in the company's defense assignments and power plant projects in the United States, Japan, and Saudi Arabia.

Kelley joined Burns and Roe in 1948. Before that, he was with the General Electric Co. for eight years. He is a graduate of Rensselaer Polytechnic Institute, Troy, N.Y., with a B.S. degree.

Catalytic

ALAN T. KNIGHT, formerly executive vice president of Catalytic Construction Co. of Philadelphia, is the new president of the firm. Since joining Catalytic in 1946 as a vice president, he has been in charge of all construction and maintenance activities.

The Man from Hobbs says:

MOVE THE BIG
LOADS—ON OR OFF
THE ROAD—WITH
HOBBS FABRICATED
SIDE RAIL
FLOAT!



609 North Main • Fort Worth • Cable Hobbsco

NEW 3/4-ton Pull-A-Way

Added to **WRIGHT**
TYPE "C" LINE!

FOUR SIZES • ¾, 1½, 3 and 6 Tons

FEATURES

- Lubricated for life
- Hooks are drop-forged
- Special alloy-steel chains
- Chain sheaves of drop-forged alloy steel
- Gear teeth cut to precision limits
- Load brake is dependable and safe
- Weights:
 - ¾-ton, 14 lbs.
 - 1½-ton, 23½ lbs.
 - 3-ton, 36½ lbs.
 - 6-ton, 63 lbs.

New 3/4-ton model

- VERSATILE
- LIGHTWEIGHT

Write to York, Pa., office for complete information



Wright Heavy Division
AMERICAN CHAIN & CABLE

York, Pa., Bridgeport, Conn.

The Hose is "HARDROK"

**GOODALL'S
HEAVY-DUTY
WIRE BRAID
AIR HOSE...**

A "Standard
of Quality"
Product



*There's No Mistaking That Yellow Cover —
Black Stripe... You See it Everywhere!*

SPECIFICATIONS: "Synplastic" oilproof tube; horizontally braided steel wire reinforced carcass; tough, wear-resistant yellow rubber cover with identifying black spiral stripe. Sizes 1/2" to 3", in maximum lengths of 500 feet.

"If it's GOODALL, it MUST be GOOD!"

Contact Our Nearest Branch for Details and Prices

Standard of Quality—Since 1870



HOSE • BELTING • FOOTWEAR • CLOTHING
AND OTHER INDUSTRIAL RUBBER PRODUCTS

GOODALL Rubber Company

GENERAL OFFICES, MILLS and EXPORT DIVISION, TRENTON, N. J.
BRANCHES AND DISTRIBUTORS THROUGHOUT THE UNITED STATES.
IN CANADA: GOODALL RUBBER CO. OF CANADA LTD., TORONTO.

Sales and Service

Equipment purchasing and servicing takes less time when you know who and where to call. Keep advised of new distribution, sales personnel and other activities.

Distributor Appointments

Acme Iron Works: Callahan Equipment Co. of Kenilworth, N. J., has been appointed distributor for the line of Ingram Tandem and 3-wheel rollers.

Diamond T Motor Truck Co.:

The following 12 new dealers have been appointed: V & E Equipment Co. of Casper, Wyo.; C. L. Tyrrell, Inc. of Sterling, Colo.; Morris County Truck Sales & Service of Whippany, N. J.; Eggiman Motor & Equipment Sales, Inc. of Madison, Wis.; Twin Ports Truck & Equipment Co. of Duluth, Minn.; Bair's, Inc. of Idaho Falls, Idaho; Carey Truck Sales, Inc. of Waukegan, Ill.; David W. Whiteford of South Bend, Ind.; Smith Truck and Equipment Co. of Joplin, Mo.; Bluebonnet Distributing Co. of Tyler, Tex.; Robert Williams Truck Sales of Youngsville, Pa.; Mauer Motor Sales Corp. of Garden City Park, N. Y.

Allis-Chalmers Mfg. Co.: The Pioneer Engineering Division of Poor & Co. has been appointed sales agent in the United States and Canada for Hydrocone crushers in sizes of 51 in. and smaller. Pioneer distributors may sell the crushers for all portable and semi-portable plants.

On the Sales Front

The Fairfield Engineering Co.:

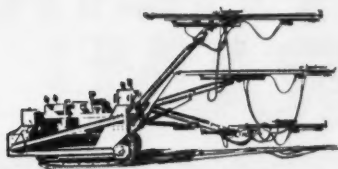
Lyle H. DeVilling has been appointed sales manager of the Standard Products Division. He will direct sales of batching plants and portable belt conveyors.

Joyce-Gridland Co.:

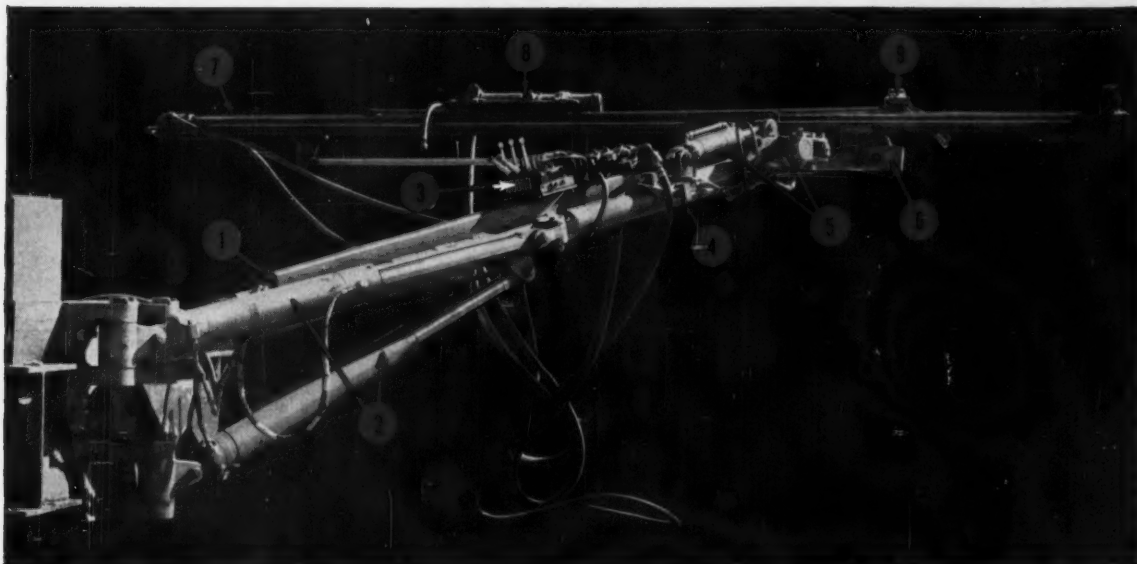
John G. Petry, former western district manager, has been named sales manager of the Industrial Division of the company.

Clark Equipment Co.:

The Construction Machinery Division has appointed Thomas W. Thies as field engineer throughout the



Here's Why **HYDRA-BOOMS** make **BETTER JUMBOS**



Ingersoll-Rand Hydra-Booms are hydraulically-operated drill mountings that are designed and built not only for greatest ease of operation, but for maximum *safety and dependability* as well. Check and compare these Hydra-Boom features — then make sure your next jumbo has all these advantages for faster, safer drilling.

1. **HOSE SHIELD** welded to boom, protects air and hydraulic hoses against damage. Simpler, neater and safer.
2. **SAFETY-LOCK CYLINDERS**—big, powerful, double-acting for fast operation in either direction. Safety-lock check valves prevent creeping or dropping of booms.
3. **BOOM-MOUNTED OR REMOTE CONTROLS**—can be mounted wherever desired. For fully centralized operation, they can be combined with remote drill controls.
4. **HYDRAULIC JUNCTION BOXES**—short hydraulic connections from end of boom simplify replacement in case of wear or damage.
5. **POWER DUMP & SWING**—separate cylinders move drill guide to any position at the touch of a control valve.
6. **PROTECTIVE SHIELD** over end of drill-feed extension cylinder prevents damage to the hydraulic connection—otherwise a vulnerable spot.
7. **SCREW OR CHAIN FEEDS**—Ingersoll-Rand can supply reversible aluminum-shell screw feeds from 30" to 144", as well as air-driven chain feeds to any practical length.

8. **FULL LINE OF HEAVY-DUTY DRIFTERS**—with the right combination of weight, power and bore size for any application.

9. **TRAVELING CENTRALIZER** prevents whipping and fatigue of drill steels, assuring substantially longer rod life.

In addition, Ingersoll-Rand has pioneered in the development of the following equipment for tunneling and mining jumbos and can meet your exact requirements for any job.

BURN-CUT "PACKAGE"—Ingersoll-Rand Downhole Drill, air-powered rotary head, chain feed and large-diameter Carset bit for drilling a central burn cut. Permits pulling longer rounds and gives improved fragmentation with less powder.

AIR PREHEATER—Specially designed electric heating units pre-heat the drilling air, eliminating fogging at the work face, promoting safer working conditions and providing better drill lubrication.

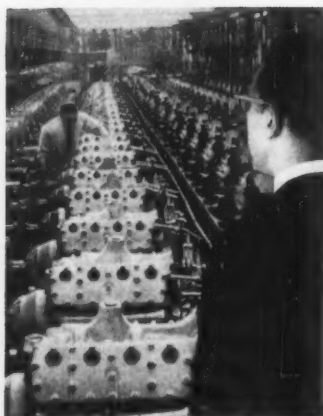
Ask your Ingersoll-Rand engineer
for complete information.

Ingersoll-Rand
103A5 11 Broadway, New York 4, N.Y.



A CONSTANT STANDARD OF QUALITY IN EVERYTHING YOU NEED FOR DRILLING ROCK

THEY TRUST THEIR BABIES TO FRAM!



More manufacturers protect their precious new products with FRAM than with any other filter. See why!

The business reputation of an engine manufacturer is at the mercy of dirt and contaminants that can ruin his products after they are sold. For fullest protection more manufacturers install Fram at the factory!

With today's rapidly rising maintenance costs it's just plain good sense to continue to protect your equipment with Fram Filters. Leading suppliers carry Fram Filters—be sure to specify Fram Filters!



FRAM CORPORATION, Providence 16, R. I.

SALES AND SERVICE...

continued

United States. Robert H. Lentzner has been named district representative for Alabama, Arkansas, Louisiana, Mississippi and western Tennessee. He will make his headquarters in Memphis.

Harnischfeger Corp. Peter F. Koch has been named manager of the newly-created Jackson, Miss., district office. The district, made up of Mississippi, Louisiana, Arkansas, and Western Tennessee, was formerly part of the Birmingham district.

Littleford Bros., Inc. John F. Harrison has been appointed manager of the newly-created Compaction Division.

Moretrench Corp. The following appointments are announced: Paul J. Jones, executive vice president and general sales manager; Louis B. Jones, Eastern District Sales Manager; and Robert G. Lenz, assistant chief engineer.

R. H. Sheppard Co. Laverne E. Smith has been appointed manager, electrical applications of the Sales Engineering Division.

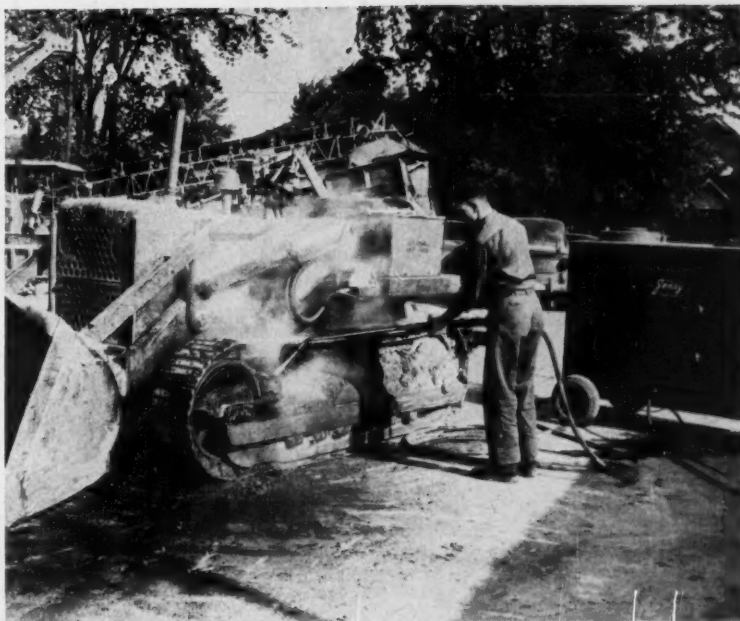
Koehring Co. The Koehring Division has appointed Paul A. McDonald as district manager for the states of California, Nevada, Utah, and Arizona. The Ka-Mo tools department of the Kwik-Mix Division has appointed Walter Lay to sales engineering consultant and Richard Henry to sales manager. The Parsons Division has appointed T. W. O'Donnell as district representative for the northeastern section of the United States.

Yale & Towne Mfg. Co. The Yale Materials Handling Division has appointed Louis W. Jander general sales manager and Francis O. Boufford New York branch sales manager.

Galion Iron Works & Mfg. Co. Charles W. Hedden has been appointed district manager in the states of Kentucky, Tennessee, Alabama, Georgia, and Mississippi.

Thor Power Tool Co. Paul J. Kennedy has been named district manager of the Cleveland sales and service branch.

continued on page 225



"Our '3500' Jenny® cuts cleaning costs 60% ... maybe more!"

SAYS RALPH BROSHEARS, PARTS AND SERVICE MGR., FLESCH-MILLER TRACTOR CO., INDIANAPOLIS, IND.

Experienced in the business of servicing and selling heavy earthmoving machinery, Mr. Broshears tells us, "Our '3500' Jenny is in use six hours out of eight, five days a week. It cleans six times faster than our old steam cleaner and does a better job!"

You can perform eleven different cleaning actions—hot or cold—with one single adjustment lever . . . you always get the right pressure and gallonage for cleaning perfection. For any heavy-duty on, or off-the-road equipment, it's easy to remove packed and caked earth with the new "3500" Hypressure Jenny Steam Cleaner. Send in this coupon now for all the facts.



HOMESTEAD VALVE MANUFACTURING COMPANY

Hypressure Jenny Division — Coraopolis, Pa. (In Canada: Hypressure Jenny Sales & Service, Ltd., 517 Jarvis St., Toronto 5, Ont. C.S.A. Approved.)

Please send me full details on the new "3500" Jenny.

97

Name.....Title.....

Company.....

Address.....

City.....Zone.....State.....



This all day sucker...

This hose can't kink when twisted, can't flatten when crushed even by the heaviest construction equipment. Acme-Hamilton Suction hose is reinforced with a continuous spiral of special non-metallic resilient reinforcement which gives it built-in bounce! The smooth-bore tube increases rate of flow, reduces turbulence. Costly downtime through accidental crushing is minimized with A — H Cord Suction Hose.

Check these features:

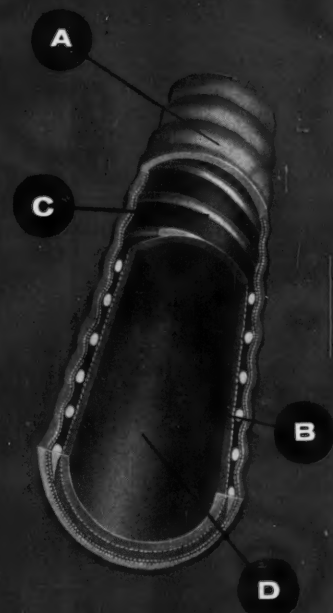
- (A) Abrasion resistant red cover.
- (B) Cotton duck plies.
- (C) Rubber bonded plastic cord in 2½" and 3" sizes only.
- (D) Smooth bore tubes.

Specify Acme-Hamilton cord suction hose when you order from your distributor, or write to Acme-Hamilton, Dept. S-3.

Acme Hamilton

MANUFACTURING CORPORATION, TRENTON 3, N. J.

Divisions: Acme Rubber Mfg. Co. • Hamilton Rubber Mfg. Corp.



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SALES AND SERVICE . . .
continued

LeTourneau - Westinghouse Co.: Maurice Hellman has been appointed district representative for the states of Utah, Colorado, and Wyoming except for several counties in the northeast and upper central regions of Wyoming. He replaces Rudy Zibert who has left the company.

In the Main Office

Cummins Engine Co.: E. Don Tull has been elected president of the company. He replaces R. E. Huthsteiner, who resigned recently. Dr. Hans Berger and J. T. Hanou have been elected to the board of directors of Cummins Diesel International Ltd.

Lister-Blackstone, Inc.: B. D. Fish has been promoted to the position of director and general manager and P. G. Clarke has been named sales manager.

Associations

Association of Asphalt Paving Technologists: The following slate of officers has been elected: president, James E. Ward, of the Barber-Greene Co.; first vice president, James Rice of the Natural Rubber Research Bureau; second vice president, Frank Williams of the Ohio State Highway Department; director at large, J. Rogers Martin, secretary of the Oklahoma Bituminous Contractors Association; director at large, Ray Bollen of the Highway Research Board; and secretary-treasurer, Ward Parr of the University of Michigan.

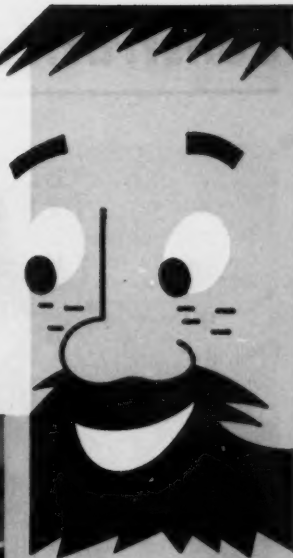
Industrial Equipment Manufacturers Council: Officers of this newly organized organization are as follows: president, Dick Chinn, of Massey-Ferguson Industrial Division; vice president, John Scowcroft, of Sherman Products Corp.; and treasurer, Jim Wormley, of Deere & Co.

Special Mention

Unit Crane & Shovel Corp.: Unit has purchased all stockholdings of Bay City Shovel, Inc., of Bay City, Mich. Operation of the Bay City plant will be continued under the following officials: S. S. Sherman, president; David Emerman, secretary-treasurer; vice presidents, C. L. Nelson, A. R. Corbett, A. B. Py, W. P. Matschke, and E. F. Rueter.

OWEN BUCKETS

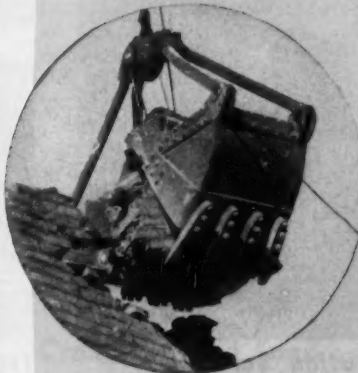
ALL
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GIANT
OF
THEM
ALL



The following five combined features make OWEN the big giant performer . . . for any type of clamshell work . . . for any model or make of crane.

1. Block and Tackle Type Reeving
2. One-Piece Head Construction
3. Riveted Bowl Assembly
4. Single Main Shaft
5. Recessed Lips

Added to these construction features are more than fifty years experience in the manufacturing of clamshells . . . and nothing else! For any job that requires a clamshell, there is an Owen to fill the bill . . . backed by proven construction design and over one-half century of experience.



Put the Giant on your crane — OWEN — and know the work will be done faster, better and more economically.

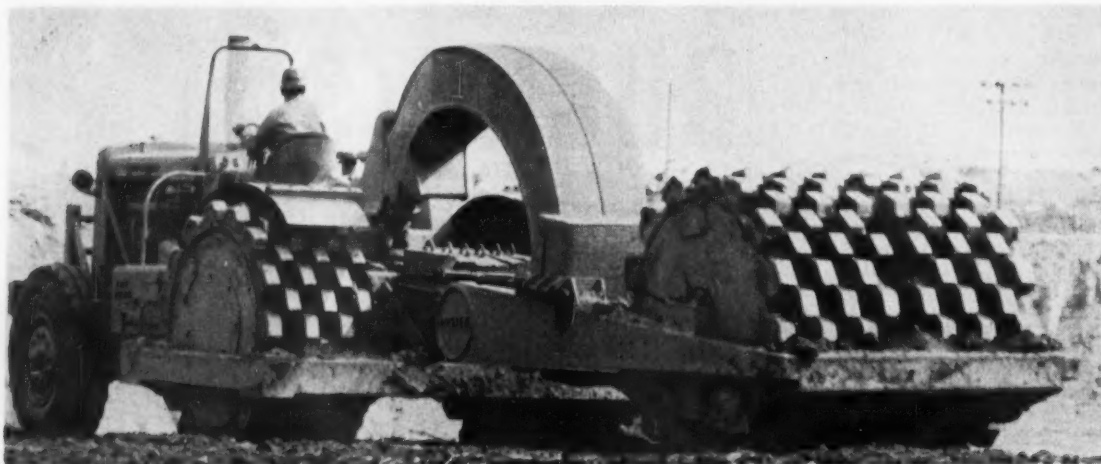
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Construction Equipment News...



High-Speed Roller Compacts Plastic Soils

Operating at speeds as high as 15 mph, the Hyster DW20A can compact 1,200 cu yd of fill in one hour, according to the manufacturer. The machine is equipped with sloped-pad tamping feet for compacting plastic type soils. Grid wheels can be substituted for work in gravel or rocky fill.

The roller is designed as an integral part of the Caterpillar DW20 tractor, but the tractor's rear wheels are replaced with wide compacting wheels. A trailer connected by a gooseneck has two addi-

tional tamping wheels. The combined rolling width is 10 ft.

Various types of ballast can be added to increase the compaction pressure. Recommended ballast is three 4,000-lb steel weights carried on the frame of the towed unit and 5,000 lb of steel ballast for the tractor. Compaction wheels can be filled with wet sand for additional weight. Each set of wheels can produce a ground reaction of 30,000 lb.—Hyster Co., P.O. Box 328, Peoria, Ill.



Double-Flange Vibrating Screed

The two screeding flanges on the Stow single-beam, double-flange vibrating screed are 3 in. wide. The first flange strikes off excess concrete, and the second one gives it a smooth finish. The unit is available in lengths from 4 to 12 ft and is handy for finishing narrow slabs and prestressed beams.

Either a 1-hp electric motor or a 3-hp gasoline engine powers the screed. The amplitude of vibration can be adjusted by turning the eccentric on its axis and locking it in position with set screws.—Stow Mfg. Co., 31 Shear St., Binghamton, N.Y.



Trencher Digs in Two Directions

Working in forward or reverse or changing directions while digging is no problem with the Arps MA-2 Trench Devil. The one-man-operated unit can dig to a depth of 54 in.; maximum width is 8 in. At a 4-ft depth and a 4-in. width it can cover 105 fph.

A reversible belt conveyor delivers the spoil only to one side of the trench, but it can be changed to either side of the machine.

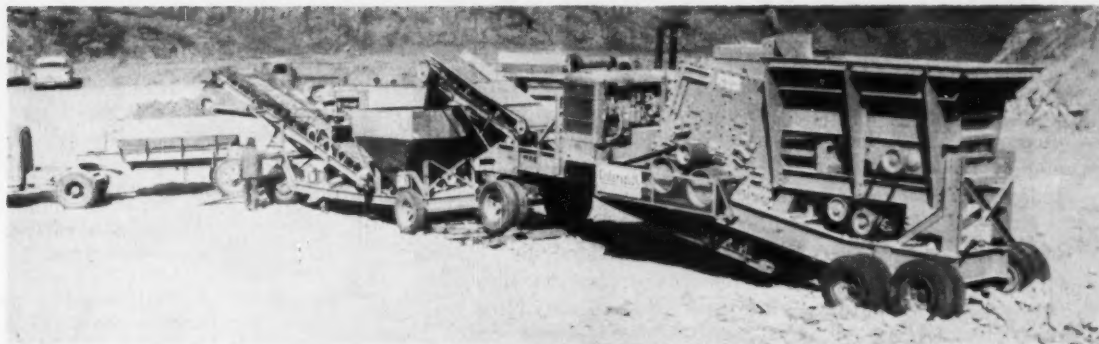
The trencher weighs 1,080 lb and can be transported on a truck or under its own power at 3 mph.—Arps Corp., New Holstein, Wis.



Mobile Hydraulic Hammer Works Close to Structures

The tower on the Arrow mobile hydraulic hammer moves back and forth along the front of the machine and permits it to cover a width of 7 ft. The 130-AS hammer is designed to break pavements and slabs close to piers, abutments, footings, and other structures. The tower can be tilted to get close to obstructions or to increase the working width to 8 ft.

Maximum height of hammer travel is 9 ft, but the tower folds back reducing the machine's height to 6 ft 10 in. for highway travel. Maximum travel speed is 30 mph; working speeds are variable up to 32 fpm in either forward or reverse through hydraulic creeper gears. The 130-AS is a front-wheel-drive, rear-wheel-steer machine.—**Arrow Mfg. Co., 194 W. Dakota Ave., Denver 3, Colo.**



Crusher-Feeder Combination

The Cedarapids 3645 portable double impeller impact breaker has been combined with a grizzly feeder to improve production. The grizzly by-passes fines and undersize material and allows only material requiring primary reduction to pass into the breaker chamber.

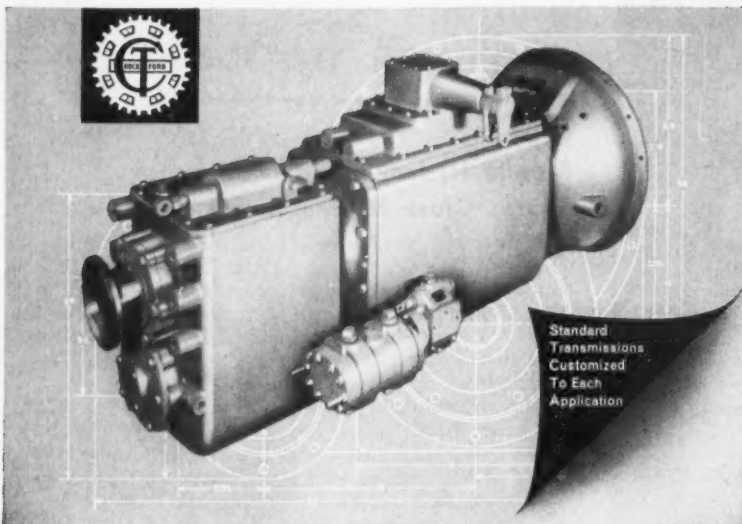
The grizzly feeder also prevents rocks from jamming, and a vibrating unit keeps the rock in constant motion. A coil spring mounting confines vibration to the feeder. Impact bars absorb loading shock, and replaceable liners reduce wear to the feeder body.—**Iowa Mfg. Co., Cedar Rapids, Iowa.**



Crane Rides on Road or Rails

Two sets of flanged guide rail wheels permit this Bucyrus-Erie crane to ride on railroad tracks as well as on highways. Basically the unit is the 10-ton Transit crane mounted on a 6x6 carrier. The flanged wheels are mounted on telescoping legs.

Standard equipment includes a five-speed transmission and a two-speed auxiliary unit, power steering with steering lockout, four outriggers, and two rail clamps on either side for trestle work. The carrier can be controlled from the crane operator's cab.—**Bucyrus-Erie Co., South Milwaukee, Wis.**



Heavy-Duty Multiple-Speed Transmission

Cotta heavy-duty transmissions match high-speed engines to big-machine production

Balancing 2300 - 2400 rpm engines for best heavy equipment production is all in a day's work for Cotta heavy-duty transmissions. Why? Because Cotta transmissions are especially engineered to handle the severe shock loads common in today's big-machine operations.

Extra-wide gears absorb 150 - 2500 ft-lb input torque loads of drilling rigs, power shovels, rock crushers, and mining equipment. Large, multiple-spline connections on alloy steel shafts eliminate stress points and provide maximum concentricity of gears.

$\pm .0005$ " tolerances aid efficiency

At least 400 to 500 inspections of each gearbox help maintain tolerances to $\pm .0005$ ". That accuracy won't wear off — even after long, tough use! Closely spaced gear ratios provide the variable speeds required on vigorous big-machine production. And, hand assembly of all Cotta transmissions provides the dependability and efficient performance that pumps, generators, locomotives, off-highway trucks, and similar equipment demand for long hours of trouble-free operation in the field.

Diagrams sent free on request

See our Catalog No. 3a /Co in *Sweet's Product Design File*. Check the detailed descriptions and specifications on standard and custom applications. Then call Cotta (TWX-RK 7720 or phone WO 4-5671) for details.

COTTA

HEAVY-DUTY TRANSMISSIONS



Pumping



Locomotives



Construction



Drilling

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS

EQUIPMENT NEWS...continued



Engine and Vibrator Work at Same Speed

A vibratory tamper synchronizes the vibrator stroke with the engine stroke to give maximum impact without any dampening effect. The Stow Synchro-Tamper operates at a frequency of 2,400 vpm with 2,200 lb of force per blow. It can tamp a variety of fill materials and move at a rate of 50 fpm.

A 3.8-hp gasoline engine powers the tamper. Standard shoe width is 18 in., but 12 and 24-in. shoes are available also. The tamper's handle is mounted in vibration dampeners to isolate the vibration from the operator.—**Stow Mfg. Co., 31 Shear St., Binghamton, N. Y.**

All Weather Welders

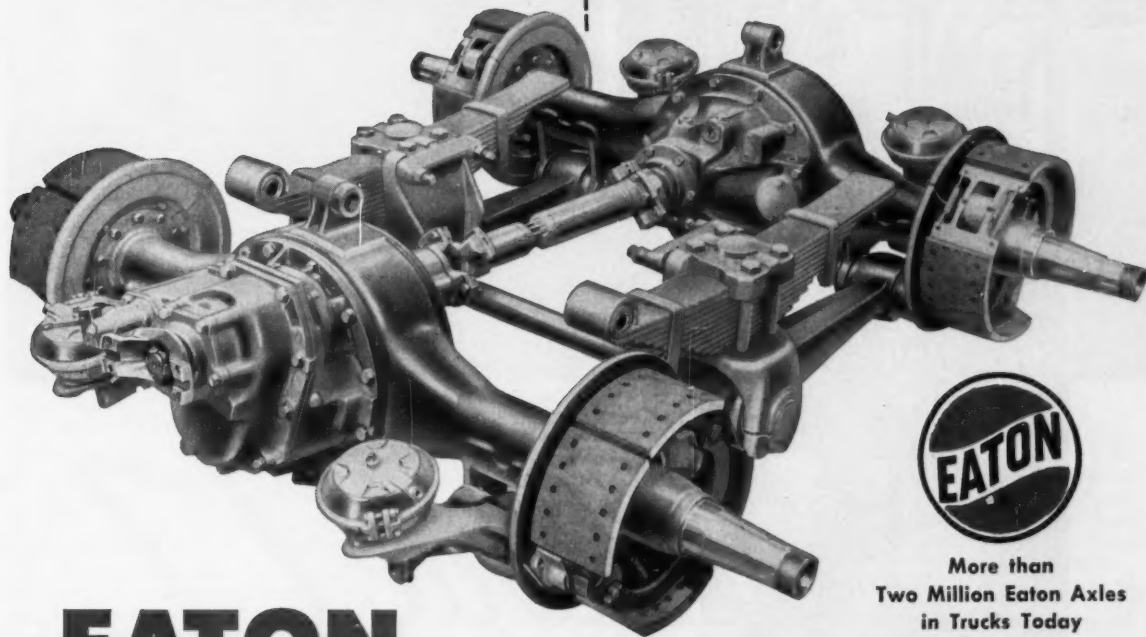
Weatherproof construction of new dc arc welders permits operation under any kind of outdoor conditions. The welders produce 200-amp, 30-v dc welding current and either 120 or 240-v ac auxiliary power. An air-cooled 12.8-hp, gasoline engine powers the units.

Welding range is 45 to 200 amp. When not welding, 3,500-w single phase, 60-cycle, ac current is available for operating lights, electric tools, or motors. Standard equipment includes two welding cable plugs with insulating sleeves, a receptacle for ac auxiliary power output, a carrying frame with handles, and a lifting eye. — **National Cylinder Gas Div., Chemetron Corp., 840 N. Michigan Ave., Chicago 11, Ill.**

**30D
SERIES**

**42D
SERIES**

**Two New Additions
to the Expanding Line of**



More than
Two Million Eaton Axles
in Trucks Today

**EATON
TANDEM AXLES**

**Provide Famous Eaton Design
in a Wider Range of Sizes**

Two new Eaton Tandem Axle models now extend the line of famous Eaton Tandems into a much wider range of vehicle capacities—from 38,000 lbs. GVW to 55,000 lbs. GVW.

Eaton Tandem Axles offer advantages not available in other tandems. Included are important savings in weight and over-all length with no sacrifice of stamina. These operation-proven axles may be selected

from Single Speed, 2-Speed, and Double Reduction types. The 2-Speed and Planetary Double Reduction models provide the many advantages of Eaton's exclusive planetary gearing design—substantiated by billions of miles of economical, trouble-free service.

Ask your truck dealer to explain the 10 big benefits you get with Eaton Tandem Axles—and how they can make your hauling operations more profitable.

EATON

AXLE DIVISION
MANUFACTURING COMPANY
CLEVELAND, OHIO



C. A. Owens, Owner and Manager
Industrial & Marine Service Co.,
Houston, Texas

Clevite 77

Keeps natural gas flowing...NATURALLY!

C. A. Owens, one of the Southwest's leading engine rebuilders who services several of the large oil companies, is shown with one of the engines at the Vienna Field, Texas, pumping station owned by Christie, Mitchell & Mitchell. Mr. Owens has this to say:

"Any owner of a high-speed engine that is operating under continuous and heavy loads must have assurance that down-time will be cut to a minimum. An engine that is down isn't making money, whether it be in a pumping station such as this, or on any type job. You've got to use an engine bearing that can take it. We depend upon CLEVITE 77 to do the job—and it does."

CLEVITE 77 (the bearing preferred by O.E.M.) with patented cast copper lead tri-metal construction provides greater load carrying capacity and longer life.

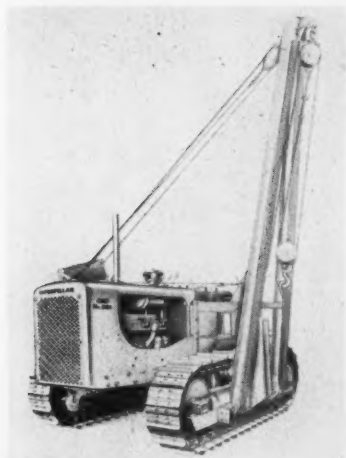
CLEVITE ALUMINUM BEARINGS: A full line of Steel Backed and Solid Aluminum bearings (identical to original equipment) is available for ALL special earthmoving equipment. A complete range of under-sizes gives you up to four regrinds, extending crankshaft life.

Complete coverage, availability and fast service from your NAPA Jobber make it easy to use the best from the world's leading original equipment manufacturer—CLEVITE.

MONMOUTH Engine Bearings

CLEVITE SERVICE: Cleveland Graphite Bronze • Division of Clevite Corporation • Cleveland 3, Ohio



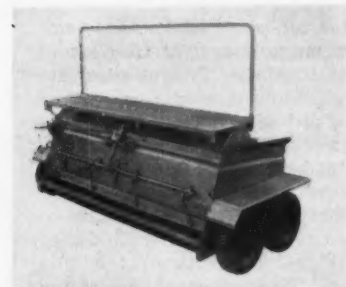


Pipelayer Has Big Lifting Capacity

The Caterpillar No. 561 series B pipelayer replaces the previous model MD 6. The new unit can lift 38,800 lb at a 4-ft overhang with 5,000 lb of adjustable counterweights. Without counterweights and at a 4-ft overhang, it can lift 20,500 lb. Counterweight groups of 2,500 and 3,500 lb are optional.

The pipelayer's engine delivers 93 flywheel horsepower. A gasoline starting engine is standard. Optional starters include a 12-v electrical system for starting the gasoline engine and a 24-v direct electric starting system.

Operating weight of the pipelayer is 25,300 lb. It rides on 74-in.-gage tracks with 18-in. grouser shoes. Standard boom length is 15 ft, but 12.5 and 18-ft booms are available also.—Caterpillar Tractor Co., Peoria, Ill.

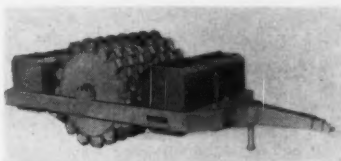


Materials Spreader For Soil Stabilization

One man can operate the Hi-Way TCS spreader for placing soil stabilization materials. The unit

covers a spreading width of 8 ft and meters the materials from 5 to 70 lb per sq yd. It rides on four wheels and is towed behind a truck.

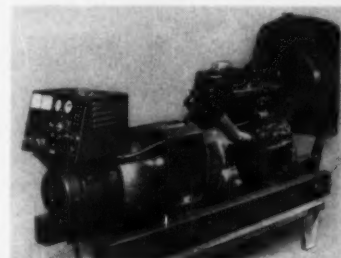
To put the spreader in operation the feedgate is cranked open, and three calibrated dials are set for the depth of the spread. A single lever controls the transmission, agitator, and conveyor. Another lever disengages either drive wheel for cornering. All of the controls are on the left side of the spreader.—Highway Equipment Co., 616 "D" Ave. NW, Cedar Rapids, Iowa.



Tamping Roller Works at High Speeds

The two-drum Hyster Model D tamping roller weighs 6½ tons and can operate at 15 mph. Fully ballasted with concrete blocks and sand, its weight is 17 tons. The two drums cover a rolling width of 6 ft; an optional third drum increases this width to 9 ft.

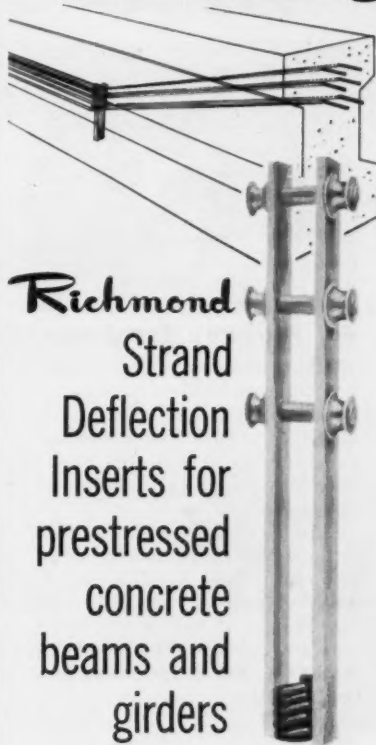
Other design features include front and rear wheel cleaners, an adjustable tongue for offset towing, a folding jack leg, and a universal hitch.—Hyster Co., P. O. Box 328, Peoria, Ill.



Big Electric Plant

A skid-mounted, gasoline or gas-powered Kohler electric plant is rated at 50 kw. Its gasoline engine develops 104 hp at 1,800 rpm. The unit is available with either radiator cooling or city water cooling. Safety devices include a low oil pressure cut-out and a high water temperature cut-out.—Kohler Co., Kohler, Wis.

Pretensioning



Included in Richmond's complete line of inserts and accessories for prestressed concrete are a variety of strand deflecting devices, designed to accommodate ¾", 1" and 1½" bolts or eye bolts to suit your project and match your pretensioning bench.

Richmond Strand Deflectors are manufactured for single, double and triple lines of strands and are available with or without keepers or rollers.

There is a standard line of Richmond Strand Deflection Inserts but, since requirements for deflecting devices vary widely, special units can be manufactured on request to suit individual needs.

For information about Richmond-engineered Strand Deflection Inserts for prestressed beams and girders contact us or our distributors: Intercontinental Equipment Co., Inc., 120 Broadway, New York 5, N. Y....and if you have a specific concreting problem, ask our Technical Department about it—they can help you. Write to:—



Main Office: 816-838 LIBERTY AVE., BROOKLYN 8, N. Y.
Plants & Sales Offices: Atlanta, Georgia • Ft. Worth, Texas • St. Joseph, Missouri • In Canada: ACROW-RICHMOND LTD., Orangeville, Ontario.



Big Highway Tractors

White tractors for highway transport operations are available with gross combination ratings from 65,000 lb to 80,000 lb. Wheelbases range from 128 in. to 164 in., and the bumper-to-back-of-cab dimension is 90 in.

Front axles are rated at 8,500 lb, and rear axle capacity is 20,000 lb. The 9000TV tractor weighs 10,460 lb with fifth wheel and 109 gal of fuel. A 235-hp engine powers the unit.—**The White Motor Co., 842 E. 79th St., Cleveland 1, Ohio.**

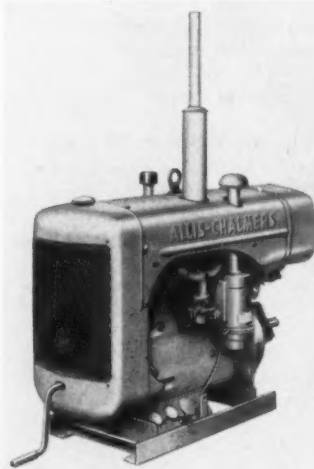


Big Rotary Compressor

Newest addition to the Worthington line of compressors is a 900-cfm portable rotary unit. It incorporates Worthington's over-under design that places the second stage compressor cylinder directly under the first stage. The compressor is equipped with two filters; one is a lifetime unit, the other is an inexpensive replaceable final filter.

Automatic controls on the compressor stop the engine in case of high discharge air temperature, overheating of cooling water, or low engine oil pressure.

To improve safety, an interlock control prevents engaging the clutch while the engine is running, and a cutout switch prevents starting the compressor with air pressure in the air receiver.—**Worthington Corp., Holyoke, Mass.**



Compact Engine

A new Allis-Chalmers gasoline engine is 46 in. long, 19 in. wide, and 30½ in. high to the top of the radiator. The four-cycle G-138 engine develops 39 bhp at 1,800 rpm. The piston displacement is 138 cu in.; compression ratio is 7.75 to 1. The engine operates on regular fuel.

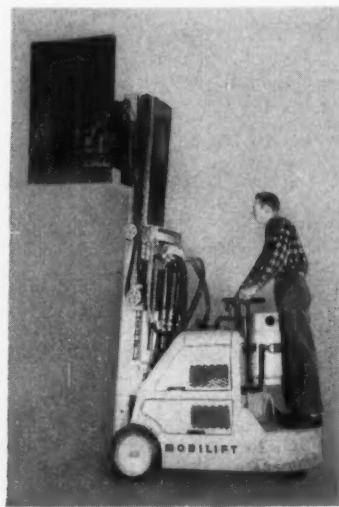
The bare engine weighs 402 lb; as a complete power unit it weighs 622 lb. It is equipped with a magneto ignition and a 12-v electrical system. — **Allis-Chalmers Mfg. Co., Milwaukee, Wis.**



Steel Roller Is Handy for Small Jobs

The Sta-Pac is a tandem steel roller that can exert a compaction pressure of 74 lb per lin in. The unit's 26-in.-dia rolls are 40 in. wide. The roller's weight can be varied from 2,100 lb to a maximum of 4,000 lb.

A 9-hp engine with a 12-v starting system and generator powers the roller. Both rolls are equipped with sprinkler bars.—**Rosco Mfg. Co., Minneapolis, Minn.**



Fork Lift Truck Has Automatic Drive

The 2,000-lb capacity ET-68 is the first of a line of Mobilift fork lift trucks that will be available on June 1. The automatic drive eliminates gear shifting and operates the roller-chain lift mechanism. The driver's left foot engages the unit's brake; brakes are locked when the driver gets off the truck. The driver stands up during operation.

A Mobilift 3-cyl, air-cooled, 15-hp engine powers the 3,600-lb lift truck. Mast height is 68 in. and extends to 109 in. The unit is 64½ in. long and 33 in. wide; turning radius is 57 in. Maximum travel speed is 6 mph, and lift speed is 45 fpm.—**Mobilift Co., Div. of Minneapolis-Moline Co., Hopkins, Minn.**

Hand-Held Tampers

Three air-powered backfill tampers range in weight from about 27 lb to 47 lb. Two of them are 52¾ in. long, including butt, and the third is 50¾ in. long. All are equipped with lever throttles and ¾-in. pipe tap hose connections for use with ½-in. hose.

The Sand Wiper backfill tampers have a specially designed front seal of neoprene-felt that cleans the surface of the piston rod and prevents dirt from entering the barrel. A variety of butts and peens is available to meet different job requirements.—**Ingersoll-Rand Co., 11 Broadway, New York, N.Y.**

THERE'S A WORLD OF "CAN DO"



in the MASSEY-FERGUSON 1001 Tractor Shovel



NEW M-F FORK LIFT HAS INSTANT REVERSE

The 204 Fork Lift is another "MUST HAVE" in the Massey-Ferguson Industrial Line. The way the big 5,000-lb. capacity 204 "slides" into a load would warm any operator's heart. And it will go anywhere a tractor will go—smooth surfaces or rough—muddy areas. Instant Reverse gives the fastest smoothest operation you've ever seen! A wide range of attachments is available for marvelous versatility.

featuring



Here's a capsule description of the M-F 1001—powerful and rugged yet agile and fast. Compare its price, performance, and quality-wise (and anyway for that matter) with the rest of the field! "HAVE DONE" performance has proven that the M-F 1001—

CAN get you there and back while others are still on the way.

CAN out-perform larger, more expensive single-purpose machines on the big jobs.

CAN handle smaller, precision jobs with economy and dispatch.

CAN provide low-cost versatility because of numerous attachments.

The M-F 1001 gets big, heaped loads because of low-pivoted bull dozer action, tremendous pryout capacity, and extremely effective rollback angle. And it gets them fast because of "touch-of-the-toe" INSTANT REVERSE. No other tractor shovel in its class can boast of such maneuverability.

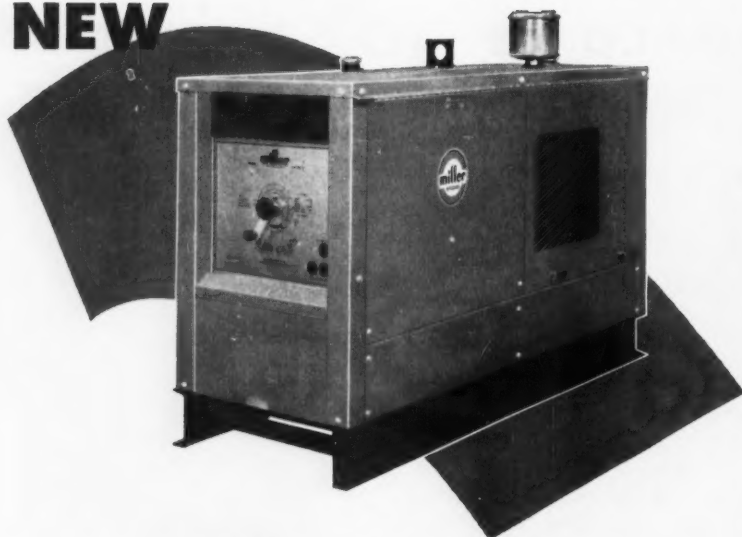
Why Wait? — Set a Date — We'll Demonstrate!



MASSEY-FERGUSON INDUSTRIAL DIVISION
Block 1000 South West St., Wichita 13, Kansas
Producing Sizeable Power for the "Sensational 60's"

MF 60-26

NEW



Miller Welder/Power Plant Reliability now available with Diesel Economy and Safety

Hercules 38 h.p. 3 cylinder direct injection diesel engine drives new Miller DD-250-L d-c welder/a-c power plant, which delivers:

- Two d-c welding ranges: 50-200 amperes, 150-350 amperes
- Duty Cycle: 100%
- Rated output: 250 amperes d-c at 40v, 100% duty cycle
- Maximum open circuit voltage: 65
- Current adjustment steps: infinite
- Power: 12 KW, 115/230v single phase, 60 cycle a-c. Up to 6.5 KW a-c while welding. 1 KW, 115v auxiliary d-c power while welding.

Complete details and engine specifications will be sent promptly upon request.

miller

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to prevent concrete from dusting or flaking for a period up to three years.

But that's just half the story! One application of TK Treatment seals, cures and hardens concrete. Eliminates the need for wet burlap or any other curing or hardening agent. TK Treatment provides up to 98% moisture retention and protects from rain or temperature changes in just 30 minutes. Think how much time, labor and money you'll save . . . and the profits you'll make. You can't go wrong because TK Treatment is guaranteed.

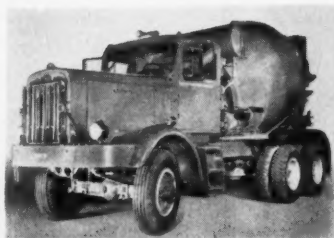
Get complete details from your TK representative or write to:

W. F. MACKLIN COMPANY, INC.

Dept. CM, 336 Taft Street N.E.

Minneapolis 13, Minnesota

EQUIPMENT NEWS...continued



Six-Wheel-Drive Truck For Transit Mix Work

This Autocar 6x6 six-wheel-drive truck is designed to carry a 6½-yd mixer over rough terrain. The truck's gasoline engine is rated at 170 hp and is coupled to a five-speed transmission with a two-speed transfer case. Gross vehicle weight of the model C5566 is 45,000 lb, but a package of optional components can increase this to 50,000 lb.

A simple belt-drive flywheel power take-off operates the mixer. The pto consists of a reinforced toothed belt that runs from a cog on the engine flywheel to the power take-off shaft.—Autocar Div., The White Motor Co., Exton, Pa.



Portable Machine Cuts Steel Bars

A hydraulically operated cutting machine can cut steel bars as big as 2 in. in dia. The Hallto Bar Cropper also can cut five ½-in. bars at the same time, or with a special set of blades it can cut angle irons. The machine is equipped with both hand and foot controls, and its hydraulic operation includes an automatic return stroke.

Three models are available. A 5-hp Briggs & Stratton engine powers the gasoline model, but 3 and 7-hp motors power the electric models. — Tideland Equipment Co., 3625 Westheimer, Houston 27, Tex.



GREATER TIRE STAMINA, FEWER JOB DELAYS

with Safety Steel Shield® Protection of U. S. Royal Super Fleetmaster!



You know how tire failure can hold up trucks, crews, jobs. Cut down time—get the U. S. Royal Super Fleetmaster. This tire's *Safety Steel Shield* forms a virtually impenetrable barrier against cuts and ruptures. Its *Double-Strength Nylon* is twice as strong as ordinary nylon. This double-armored protection gives you brute strength that defies vicious off-road impacts, yet gives unmatched stamina for long hauls at highway speeds. Call your U. S. Royal Dealer right away!

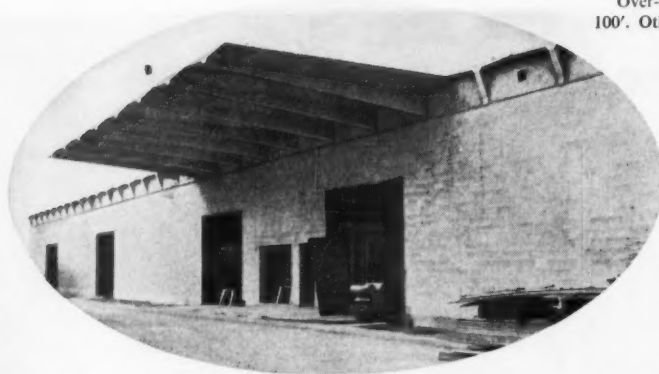
U.S. ROYAL TRUCK TIRES



United States Rubber

Rockefeller Center, New York 20, N. Y.

Over-all length of cantilevered beams is 100'. Other 27 beams are 80' long. All are 8' wide at top and 3' deep.



Single Tee Beams FOR SPOKANE WAREHOUSE

Owner: Exchange Lumber & Mfg. Company

Architect: Henry J. Swoboda

Structural Engineer: Jack M. Lyerla

Contractor: Walter G. Meyers & Sons

Prestressed Units: Central Pre-Mix Concrete Company

Concrete Block: Layrite Products Company

All of Spokane, Washington

Composed of just 35 prestressed concrete LIN TEE BEAMS, the roof of this building provides for an unobstructed floor area 80' x 280'. And by adding a 20' cantilever to eight of the beams, the loading entrance is given an attractive protective canopy.

Flexibility in design is only one of the reasons for the growing use of prestressed concrete in all types of construction. Others are its ease and speed of erection, low first cost, fire-resistance and negligible maintenance costs.

In the manufacture of prestressed units, such as these LIN TEES, Central Pre-Mix Concrete Company uses Lehigh Early Strength Cement. Like other manufacturers across the country, they have found that it affords them the most efficient, economical production cycle.

This is another example of the advantages of Lehigh Early Strength Cement and modern concrete construction.

Lehigh Portland Cement Company, Allentown, Pa.

**LEHIGH
CEMENTS**

Two cranes place 100' beam quickly and easily. Lehigh Early Strength Cement was also used in concrete block for masonry walls.





Concrete Vibrator

A 180-cycle motor-in-head vibrator has been added to the Champion Hi-Cycle line. The unit is available with either a 21-in. or a 15-in. head and a removable steel or rubber nose or a fixed steel nose. It is equipped with a 10-ft handling hose that can be extended in 10-ft increments.

The vibrator motor is rated at 1½ hp; it contains no brushes or commutators. The motor and eccentric sections can be removed easily. All switches and connections are waterproof.

To supply adequate power to this vibrator, Champion also has introduced a 2,500-w electric plant with a built-in engine idler. The generator is equipped with 230-volt, 3-phase outlets and can power two to four ac/dc high-cycle vibrators. An additional outlet provides 115-v dc current for portable power tools. Vibrators and generators are available for 110-v operation also.—Champion Mfg. Co., 3700 Forest Park Avenue, St. Louis 8, Mo.

Compact Welders Are Handy for Stacking

Transformers are laid on their side to reduce cabinet height in A. O. Smith's Premier line of ac welders. This feature permits stacking of as many as three units on top of each other.

The welders are available in 300, 400 and 500-amp ratings, but the cabinet size is the same for all models—24 in. wide, 30 in. deep, and 28 in. high. The Premier line will be sold on a custom-assembled basis—basic units will be stocked in warehouses, but capacitors, switches, and other accessories will be added to suit the customer. — A. O. Smith Corp., Welding Products Div., Milwaukee, Wis.

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equipment that will make your lube truck the best on the road.

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EQUIPMENT NEWS...continued



Small Trencher Has Four-Wheel Drive

The Bus Brown trencher drives on all four wheels while digging, but in travel gear only the two rear wheels drive it. A 12-hp Wisconsin engine powers the 1,100-lb machine.

Trenching widths range from 4 to 12 in.; maximum working speed is 12 fpm. The digging boom on the new model 468R trencher is hydraulically controlled. — **The Brown Mfg. Co., Inc., Woodbine, Iowa.**

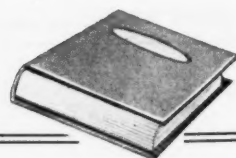


Welder-Power Plant Handles Seven Jobs

The Miller AD-225-L combination ac/dc welder and power plant can perform seven different functions, according to the manufacturer. As an ac welder the unit delivers 300 amp at 30 v; for dc welding its rating is 225 amp at 30 v. Open circuits are 75 v ac or 65 v dc. The unit also can handle metallic inert gas welding.

Power output is 1 kw at 115 v dc of auxiliary power when welding or 7 kw of 115/230-v ac current when the unit works as a generating plant. Also, it can warm viscous fluids for pumping, thaw frozen pipes, and handle either battery charging or battery boosting.

A 25-hp, 2-cyl, air-cooled Kohler gasoline engine powers the welder. A high frequency unit, remote controls, and a trailer are optional. — **Miller Electric Mfg. Co., Inc., Appleton, Wis.**



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Brings you tested methods for compiling profitable bids on bridges, buildings, and other types of construction. Describes the equipment, tools, materials, and labor involved in all phases of fabrication and erection. Included are details on how to estimate columns, beams, connections, built-up sections, girders, etc. By **G. A. Saunders, Lehigh Structural Steel Co.** 274 pp., 176 illus., \$9.50

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FRAMES AND ARCHES

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Shows how to save time in analyzing complex structures by using a new concept in solutions of frames and arches of constant or variable cross section. Gives over 400 condensed solutions for twenty principal types of statically indeterminate frames and arches—usable in steel, concrete, and wood design. Includes comprehensive charts and tables to facilitate analysis of haunched frames and arches. By **Valerian Leontovich, Civil Engineer.** 494 pp., 523 illus., \$20.00

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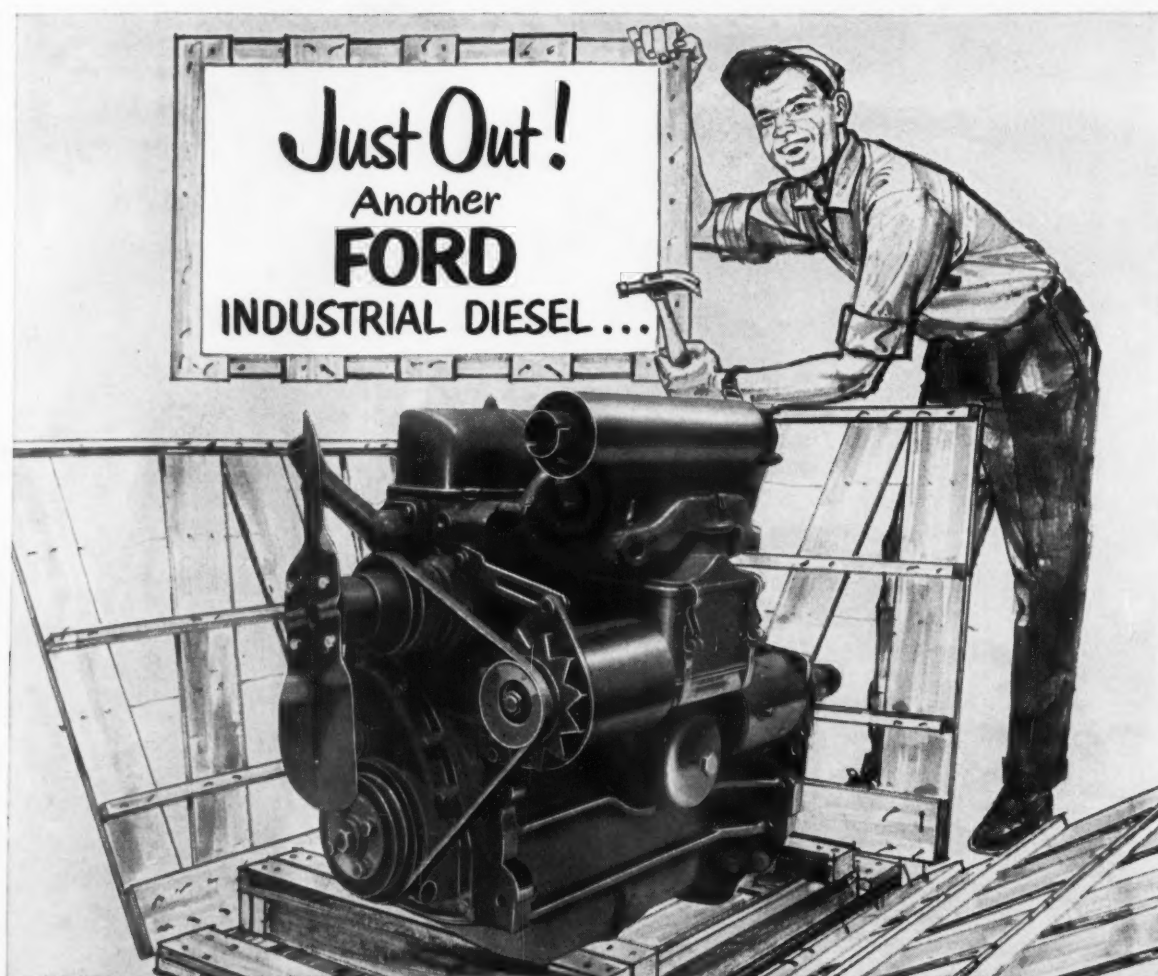
New rear dump hauls 15% more payload — built entirely from USS "T-1" Steel. This Athey PR 619 T-line trailer hauls 25 tons but weighs only 19,260 pounds. One man can move more tons of material, less fuel is consumed when running empty, and the machine has a faster cycle. The big improvement in performance starts with the use of USS "T-1" Steel *throughout*. This "strong boy" of metals cuts dead weight, substitutes 15% extra payload. Tougher, it defies relentless abuse, adds life. USS "T-1" Constructional Alloy Steel has a minimum yield strength of 100,000 psi. It is weldable and has high resistance to impact abrasion and corrosion. What's more, it retains its toughness at temperatures even down to 50 below zero. This combination of properties permits design for maximum weight savings coupled with ability to take abuse. In addition to "T-1" Steel, United States Steel makes other brands of steels for a wide variety of applications: USS COR-TEN, USS MAN-TEN and USS TRI-TEN with a 50,000 psi minimum yield point, in addition to a complete range of carbon and stainless steels.

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FORD PRESENTS THE 172^{CUBIC} INCH DIESEL FOUR !

(and it's interchangeable with the 172-cu. in. gasoline engine)

To meet the growing demand for diesel power, Ford now offers a choice of three economical diesels—the highly efficient 172-, 220- and 330-cubic inch models.

Whichever you select, you'll be getting a completely modern diesel that delivers the high torque necessary to handle tough jobs with outstanding operating economy and easy, low-cost maintenance.

Ford Diesels also offer dependable 12-volt electrical systems for quick starting . . . replaceable cylinder sleeves that eliminate costly reboring . . . and rotating exhaust valves for better seating, longer valve life.

What's more, Ford's 172 Diesel and 172 Gasoline engines are interchangeable in your equipment. Many parts, too, are interchangeable between these engines. And low-cost Ford parts and service are always available at any nearby Ford Power or Tractor Dealer.

For greater productivity and more profit in the long run, it will pay you to check the 172 model or other Ford Diesels at your Ford Industrial Products Headquarters.

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ENGINE SERIES		172 FOUR DIESEL	220 FOUR DIESEL	330 SIX DIESEL
Basic Model		DD	X	Y
Type		4-Cyl. O.H. Valve	4-Cyl. Diesel	6-Cyl. Diesel
Bore and Stroke—Inches		3.9 x 3.6	3.94 x 4.52	3.94 x 4.52
Displacement—Cubic Inches		172	220	330
Brake Horsepower	Dynamometer	59 @ 2400	60 @ 2250	96 @ 2250
	80% Dyn. BHP	47 @ 2400	48 @ 2250	77 @ 2250
Torque	Dynamometer	140# @ 1200	151# @ 1600	236# @ 1600
	80% Dyn. BHP	112# @ 1200	121# @ 1600	189# @ 1600
Compression Ratio		16.5 to 1	16 to 1	16 to 1



Truck-Mounted Drill

The Acker Presidente core drill now is available for truck mounting. It can be powered by a separate 51-hp gasoline or diesel engine, or it can work from the truck engine power take-off.

Drilling capacity of the unit is 1,000 ft for core drilling and 300 ft for auger drilling. Maximum hole diameter is 24 in.—**Acker Drill Co., Inc., P. O. Box 830, Scranton 2, Pa.**

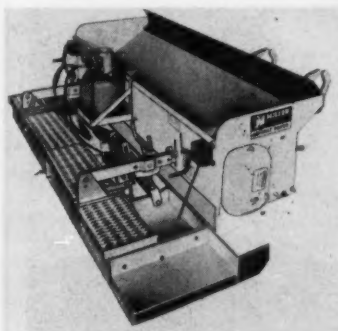


Powder-Actuated Fastening Tools

Two models of powder-actuated hand tools can drive fasteners with 1/4- and 3/8-in. diameters. The drivestuds range in length from 1 in. to 6 in. and are either threaded or headed. Eye pins for concrete also are available.

The Nelson 660 fastener weighs about 6 1/4 lb and is 14 in. long. It drives only 1/4-in. studs with a .25-caliber powder charge and automatically ejects spent cartridge cases. The model 600 can

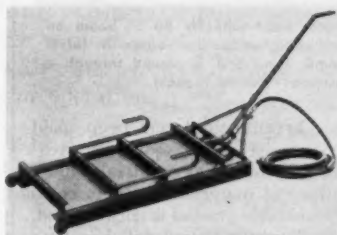
handle either 1/4-in. or 3/8-in. barrels with .22 or .25-caliber powder charges. This model is equipped with a removable breech plug instead of the automatic cartridge ejector.—**Nelson Stud Driver Div., Gregory Industries, Inc., Lorain, Ohio.**



Spreader Controls Can Be Bought as a Kit

A thickness gage and a screed crank hoist are available as a kit for installation on any Miller towed paver. The controls are offered as standard equipment on new models of the pavers.

A screed adjustment screw sets the thickness of the asphalt to the level pointed out by the thickness gage indicator needle. Subsequent adjustments can be made on the job to meet various paving conditions. The screed crank hoist raises or lowers the spreader box to control the thickness of the material courses.—**Miller Spreader Corp., 4020 Simon Rd., Youngstown, Ohio.**



Asphalt Surface Heater

A one-man-operated asphalt surface heater is handy for removing bumps, push-ups, and traffic lane lines and for drying pot holes before patching asphalt pavements. The unit is available in two models. It is fired by LP gas and is equipped with hooks for hanging on the tailgate of a truck.—**Es-sick Mfg. Co., 1950 S. Santa Fe Ave., Los Angeles 21, Calif.**

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FOR Quick, Pressure-Proof Connections ON AIR HOSE AND COMPRESSORS...

"Air King" Quick-Acting, Universal Type Coupling. Built on plain, rugged lines to assure long trouble-free service under all conditions. Locking heads identical for all sizes of hose or threaded ends within the "Air King" size range. To connect, press together and apply quarter-turn. Reverse to disconnect. Equipped with auxiliary locking device for added safety. Regularly furnished in bronze or rust-proofed malleable iron, but also available in special metals.



Made in Hose Ends and Male and Female I. P. T. Ends, in sizes up to 1".

FOUR-LUG STYLE



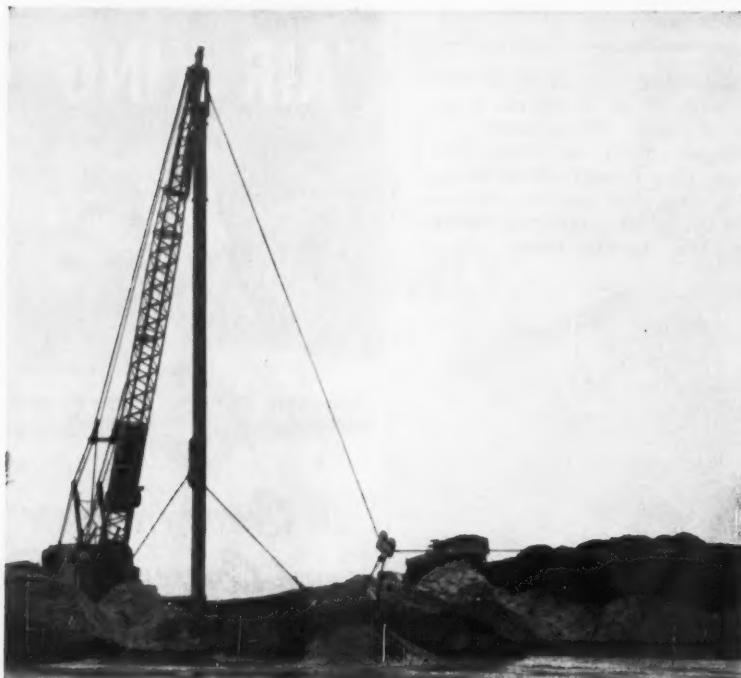
Same as above in locking action, but for larger hose sizes. Hose ends and I. P. T. Ends in sizes 1 1/4", 1 1/2" and 2".

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DIXON VALVE & COUPLING CO. LTD. TORONTO Associate Companies
Rock Iron Company, Inc. Quincyville, Pa. Precision Draw Steel Company, Canton, N.Y.



Shoreline Reclamation by Crescent Scraper

Several million yards of sand and gravel are being used to extend the plant area of a Canadian steel company. Bottom-dump barges are used for the initial 20 ft. of fill. The additional 10 ft. below water and up to 15 ft. above lake level is built by redistributing the barge piles along the existing shore line.

The material is redistributed by a crane using a 5-yd. Crescent Scraper Bucket and carrier. On operating spans of up to 350 ft., the crane's hoisting line is used as a track cable. It is reeved through a block at the boom tip to a tail barge anchored offshore.

The barge swings on 200 ft. of anchor cable which permits a long period of crane operation before the anchor is shifted to a new location. The crane travels along the shore reclaiming material from a pie-shaped segment with the tail barge anchor as the vertex of the angle. The Crescent Bucket returns by gravity the full 350-ft. span. At average haul distances, it delivers 200 yd. per hr.

A Sauerman Crescent Scraper and carrier with a dragline crane is often the most economical solution to difficult excavating jobs. The normal reach of the dragline is greatly extended by using a track cable with a Crescent and carrier assembly. So equipped, its range is limited only by the spooling capacity of the drums.



Tubular mast supports 80 ft. boom on track cable setup. Tail barge in background. Load line is reeved through a Sauerman Fairlead on mast.

This arrangement has been used quite successfully for contract excavating jobs involving relatively small quantities of material. In many cases where unstable ground is encountered, the crane unit may be located on firm ground and the use of mats eliminated.

Find out how much you can extend the reach of your crane and increase its capacity. Write or call giving the make, model number and boom length of your machine. Field Report 231 and Catalog J. gives more information on Scraper operations with cranes.

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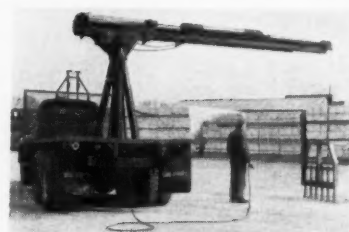


Big Primary Capacity Boosts Crusher Output

Universal's Giant gravel plant incorporates a 13x36-in. matched jaw primary crusher with two moving jaws. It delivers 400 tph and can produce four different products, including chips and sand.

A Universal 30x26-in. roll crusher helps improve the unit's secondary crushing efficiency. The plant is equipped with a screen that measures 4x14 ft and consists of three decks.

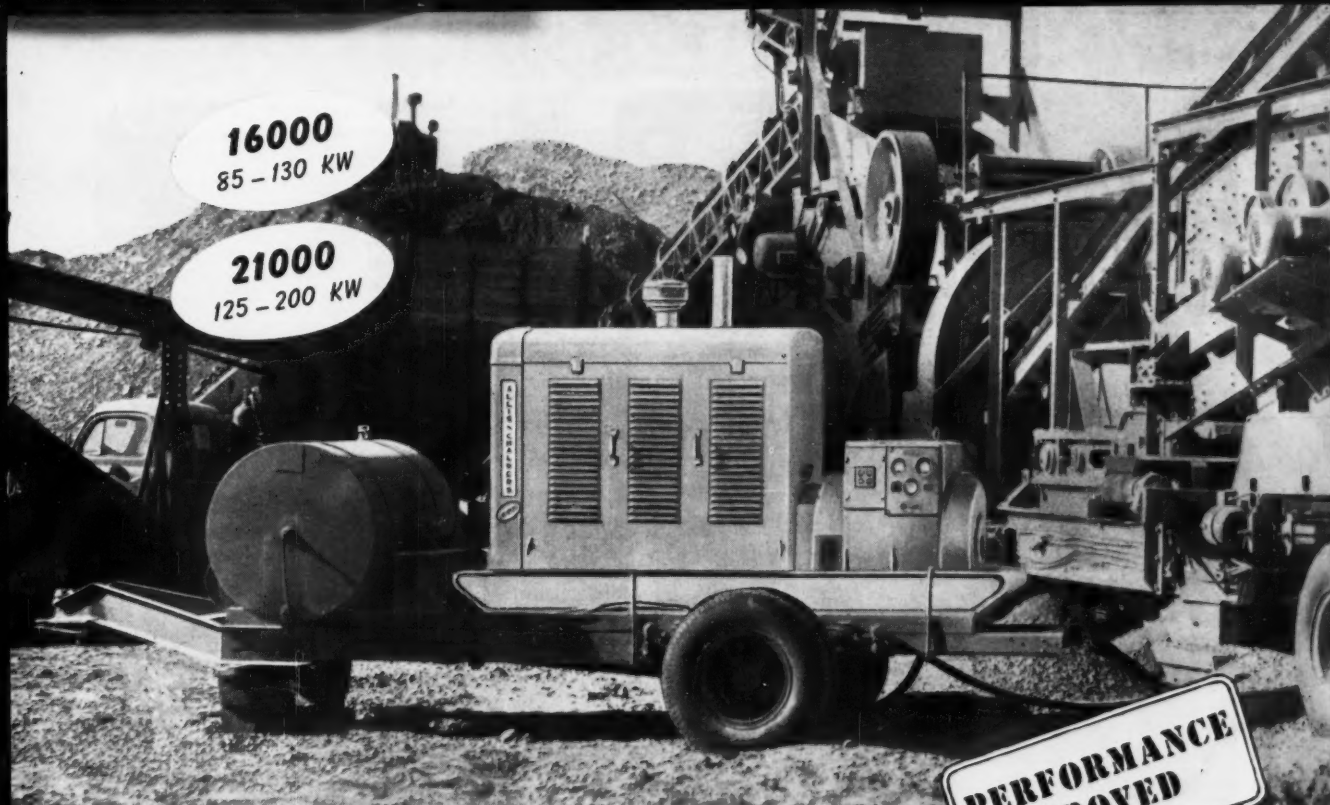
Feed and delivery conveyors are 36 in. wide. Optional equipment includes a 180-in. swivel feed conveyor, a plant-mounted hopper, a 30-in. plate feeder, and additional portable conveyors. The entire unit is mounted on a goose-neck frame with a running gear. — **Universal Engineering Corp.**, 625 "C" Ave. NW, Cedar Rapids, Iowa.



Truck Attachment Unloads Materials

A crane attachment for trucks is equipped with a 17-ft boom that can rotate in either direction during loading or unloading of materials. The Side-O-Matic model T unloader can handle concrete blocks, brick cubes, or palletized materials such as mortar, cement, boards, stones, or other masonry products.

The unit is available for tandem-axle trucks and trailers or for front mounting behind the cab. A gripper type block or brick fork is available as optional equipment. — **Side-O-Matic Unloader Corp.**, P. O. Box 1561, York, Pa.



This Allis-Chalmers 16000 diesel generating set provides electric power for motors on a crusher operating near Great Falls, Montana. Primary power source for the crusher is an Allis-Chalmers 21000 turbocharged diesel power unit, companion to the 16000.

NEW DIESEL GENERATOR SETS WITH BRUSHLESS GENERATORS

show outstanding performance advantages

Can save \$3,000 a year on fuel alone — Users tell us the 21000 turbocharged diesel saves as much as 2½ gal. of fuel in every 10 compared with other engines, or 1 to 4 gallons for every hour of operation.

"Startingest engine we ever had," says a northern user. "We threw away the ether can with temperatures way down below freezing — no external heating either." With their unique controlled combustion, these engines start and pick up loads in 4 to 10 seconds.

Safe in dusty, corrosive or explosive atmospheres — Brushless generators have new simplicity. There are no slip rings, no brushes, no commutators to wear or to spark. They are replaced by newly developed, non-aging silicon rectifiers that rotate with the armature.

Precisely regulated power — New Allis-Chalmers magnetic amplifier type static voltage regulator has no moving parts or contacts, no parts to burn or wear. There's unequaled fast response to sudden changes in load — heavy motor starting loads are easily picked up.

Allis-Chalmers manufactures and stands behind all four major components. This means coordinated engineering, matched performance, undivided responsibility — an Allis-Chalmers exclusive. Sets are simple, unit-type, self-contained — mounted on husky skids. No special foundation required, no danger of misalignment. Electrical connections are simplified to speed installation and reduce related costs. See your dealer for more about these outstanding 16000 and 21000 sets. Allis-Chalmers, Milwaukee 1, Wisconsin.

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WATER SUCTION HOSE



Built to deliver whatever you can pump!

Sharp sand . . . silt . . . mud . . . small rocks . . . even ice. That's what puts the wear on hose. And with today's high-speed pumps the abrasive action multiplies.

Thermoid-Quaker Water Suction Hose is *triple-tough*. It's sturdy enough to meet the roughest, toughest, on-the-job wear. Yet it's light-weight and flexible, easy to carry, easy to set in place.

This triple-toughness is the result of three specially-designed layers. First, a black, rubber tube that resists mild acids and alkaline water . . . and abrasion. Second, a strong,

durable carcass of heavy cotton fabric and heavy-gauge, copper-coated spiral steel wire that resists kinking and crushing. Third, a black, rubber cover that stands up under the toughest treatment . . . combats exterior abrasion . . . withstands exposure to sunlight and rough weather.

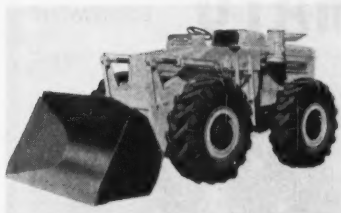
Ask your Thermoid Division Distributor about this triple-tough hose. It comes in sizes and constructions for every pumping requirement, in 50-foot maximum lengths. Or write *Thermoid Division, H. K. Porter Company, Inc., 200 Whitehead Road, Trenton 6, New Jersey.*

THERMOID DIVISION



H.K. PORTER COMPANY, INC.

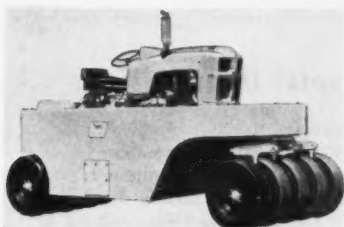
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More Power Helps Lift Bigger Loads

Lifting capacity of the H-90 series B Hough Payloader has been increased to 18,000 lb; the 9,000-lb operating capacity remains unchanged. The loader's new turbo-charged Cummins diesel engine is rated at 162 hp. A 153-hp GM diesel is optional.

The H-70 series B Payloader also can handle bigger loads. Its lifting capacity is 13,000 lb, but the operating capacity is 7,000 lb as in previous models. A 124-hp Cummins diesel engine powers this unit. Optional power plants are IH or GM diesel engines.—**The Frank G. Hough Co., 706 Seventh Ave., Libertyville, Ill.**



Rubber-Tired Roller Rides on 11 Wheels

The 11 wheel American Road Runner roller weighs 13 tons and exerts a rolling pressure of 57.5 psi. The 11WG tandem roller also exerts 295 lb of pressure per lin in. of tire width.

An automotive type hydraulic steering system controls the unit. It is equipped with a reversomatic control and a torque converter. The differential and final wheel drive are designed as a unit.

The roller's two center rear wheels are spring-mounted to improve the drive wheel traction. Accessories include one 80-gal or two 160-gal water tank systems, working and running lights, and 10-ply 90-psi tires with demountable rims. — **American Steel Works, Inc., 2700 Holly St., Kansas City 8, Mo.**

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by FIBRE-METAL



SuperLiteTM ALUMINUM SAFETY HATS & CAPS

TOUGH...ribbed crown for highest impact resistance. • COOL...reflects, does not absorb heat. Well ventilated. • COMFORTABLE...men prefer and LIKE to wear SuperLite! • ONE SIZE FITS ALL HEAD SIZES. • NO LACING...exclusive design! Only headband ever needs replacing...a big saving! TOPS IN HYGIENE...easily sterilized. Waterproof. NON-TOXIC...mildew- and fungus-proof Polyethylene suspension. No deterioration. • FULLY TESTED...to exceed highest safety standards. • LIGHT-WEIGHT...trim and good looking.

• SuperLite "shells" are of tough aluminum alloy, tempered and ribbed for maximum resistance to blows from flying or falling objects. SuperLite's exclusive Polyethylene suspension gives maximum shock absorption and unmatched comfort. It is and remains flexible, conforms to head shape, and is deep fitting to "stay put" in any working position.



DUAL SUSPENSION

Suspension is both a "fixed" safety factor as well as an "adjustable" clearance from the Shell.

Bulletin
No. 55

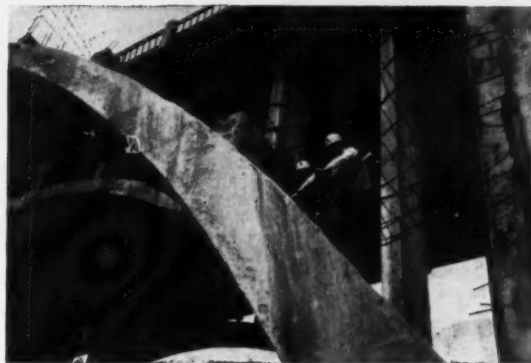
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The WORLD'S LARGEST MANUFACTURER of SUPERIOR PROTECTIVE EQUIPMENT

CUTTING POWER!

2-inch Holes Through Concrete 41 Inches Thick!



Twenty-seven 2-inch holes through reinforced concrete 18-41 inches thick—that was the job to be done on a bridge project. Using one Longyear diamond drill, a contractor completed the work in a few days at low cost despite the fact that the bit was cutting steel 10% of the time. The job was finished on sched-

ule with Longyear diamond drilling equipment. What other type of drilling equipment could have done this work at justifiable cost? Call your Longyear dealer to find out about the great advantages and applications of Longyear diamond bits and the all-new industrial drills.

Adv-168



E. J. LONGYEAR CO.

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Minneapolis 2, Minnesota
Phone: FEderal 9-7631

Please send complete information on Longyear Diamond Bits and Industrial Drills. Also the name of my nearest Longyear dealer.

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FIRM _____

ADDRESS _____

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STATE _____



8 CONTRACTORS PRE-DEWATER WITH FLYGT on BIG SEWER JOB

On a \$23,180,000 sewer bond issue in Orange County, California, 8 separate contractors won their race against time and severe ground water intrusion with Flygt Electric, Submersible Pumps. The 19-mile Miller-Holder Trunk Sewer job experienced water intrusion from the first excavation, and it threatened to slow work to a crawl and run costs to astronomical highs. Key to the final success of the eight separate but simultaneous contracts was efficient, economical pre-dewatering developed jointly by Gridley Equipment Co. and Stanco engineers. Featuring more than 40 Flygt Electric, Submersible Pumps, the pre-dewatering systems drained and kept dry ditches along the right-of-way at substantial savings over other dewatering methods. Typical of contractor comments on the system:



"This system really does the job," declares Pete Barrett on the J. S. Barrett Co. \$2,667,727 contract for installation of 5½ miles of 78-inch line. "You just drop Flygt Pumps in the hole, turn them on and make only periodical inspections. They keep the ditch dry at realistic cost with none of the trouble normally experienced with suction-type pumps."



"These Flygt Pumps give you a chance to go home and sleep at night," says N. A. Artukovich on his company's \$1,846,870 contract for placement of more than 5 miles of 51- to 63-inch pipe. "The Flygts require little attention and keep the pipe and ditch dry despite continuous intrusion conditions. The pumps handle a lot of solids."

Flygt Electric, Submersible Pumps range from 1½" 85 gpm to 8" 3100 gpm capacity. Heads to 220' — higher in tandem. Designed and built for tough applications, they are adaptable to any dewatering job. Flygts run continuously with little attention, handle a high degree of solids, need no priming, are easy to handle and service. Ask today for literature and an on-the-job demonstration.

FLYGT
PUMP BETTER ELECTRICALLY
— USE FLYGTI

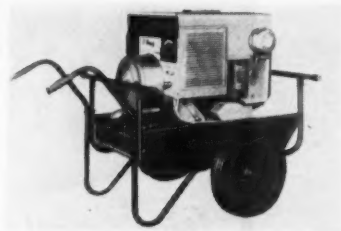
WESTERN SALES & SERVICE

Stanco
MFGS. & SALES INC.

1666 Ninth St. (Corner of Olympic & Ninth)
Santa Monica, California



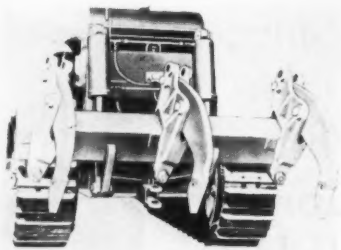
EQUIPMENT NEWS...continued



Welders Deliver More Auxiliary Power

Portable dc welders built by A. O. Smith produce 3,500 w of 60-cycle, single-phase ac auxiliary power. This is 2,000 w more than previous models. Maximum dc welding output is 200 amp with a welding range from 45 to 200 amp. The Bug welders handle all types of ac and dc electrodes from 1/16 in. to 5/32 in. in dia, and most 3/16-in. electrodes.

A special design incorporates starter windings in the main generator giving all models electric starting. Other equipment includes a two-speed engine throttle to control ac output or welding current, a flywheel magneto with two magnets, and a two-wheel dolly.—A. O. Smith Corp., Welding Products Div., Milwaukee, Wis.



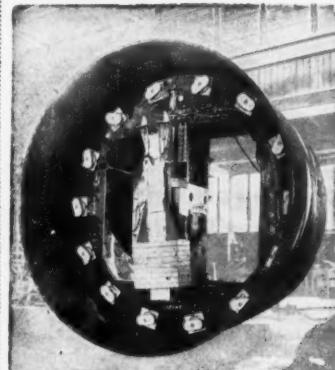
Big Ripper

A hydraulically controlled ripper for the International Harvester TD-25 crawler tractor can penetrate to a depth of 48 in. Shanks swivel 15 deg in either direction and can be adjusted for various depths by movable pins in the swing brackets. Points are replaceable.

Straight shanks are available in 24, 42, and 48-in lengths; curved shanks are 24 in. long. A push block that straddles the center shank can be installed for booster ripping. Pipeline and cable laying shanks are available also.—The Greenville Steel Car Co., Greenville, Pa.

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EQUIPMENT



Design and construction of Mayo Shields and other Sandhog Equipment are backed by over 25 years of job-tested experience throughout the world.

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- e. TRACTOR-DRAWN SCRAPERS
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The guard rail held because it's steel

Steel guard rail is made *and tested* for a wide margin of safety. When this heavyweight plowed into the Bethlehem guard rail along the Southeast Expressway near Boston, the rail held and prevented the truck from rolling down a bank onto a highway below. Thanks to the strength of steel, this accident was not as tragic as it might have been.

Galvanized Rail Cuts Maintenance

Today Bethlehem steel guard rail comes galvanized. The protective coating holds maintenance to a minimum, and gives many years of service.

High Strength for Maximum Protection

Bethlehem beam guard rail has the ideal combination of high strength and low maintenance. That's why Bethlehem steel guard rail protects literally thousands of miles of the nation's roads. Send for our free booklet that describes beam guard rails in detail. Just write to the nearest Bethlehem sales office, or direct to us at Bethlehem, Pa. Ask for Booklet 514.



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The Homelite gasoline-engine-driven Diaphragm Pump handles mud, muck, sand and goo without clogging. 5000 gallons per hour. Total lift guaranteed at 28 feet. And total heads up to 50 feet, including friction. Automatic priming,

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The Homelite Diaphragm Pump was designed with two important points in mind... (1) top performance and (2) bottom maintenance. Your nearest Homelite man will gladly tell and show you all the "reasons why". Call him or write to us today. You'll get action.

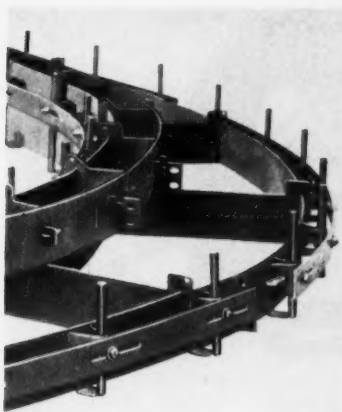
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HOMELITE • A DIVISION OF TEXTRON INC., 1005 RIVERDALE AVE., PORT CHESTER, N. Y.

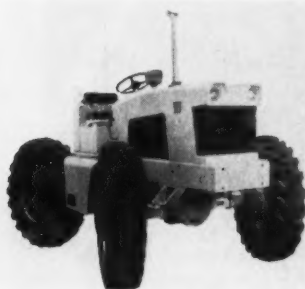
In Canada — Terry Machinery Co., Ltd.



Curved Concrete Forms

Flexible steel forms can be adjusted to fit curved sidewalks, curbs, gutters, or low walls. The forms are available in 10-ft lengths with heights ranging from 4 to 24 in. Sections may be joined together to make up any required contour.

To install the forms, stakes are set on the curve, and a band on the forms is adjusted and tightened with lock nuts. After pouring, the form can be repositioned to repeat the same curve without any adjustments. — **Binghamton Metal Forms, Box 848, Church St. Station, New York 8, N. Y.**



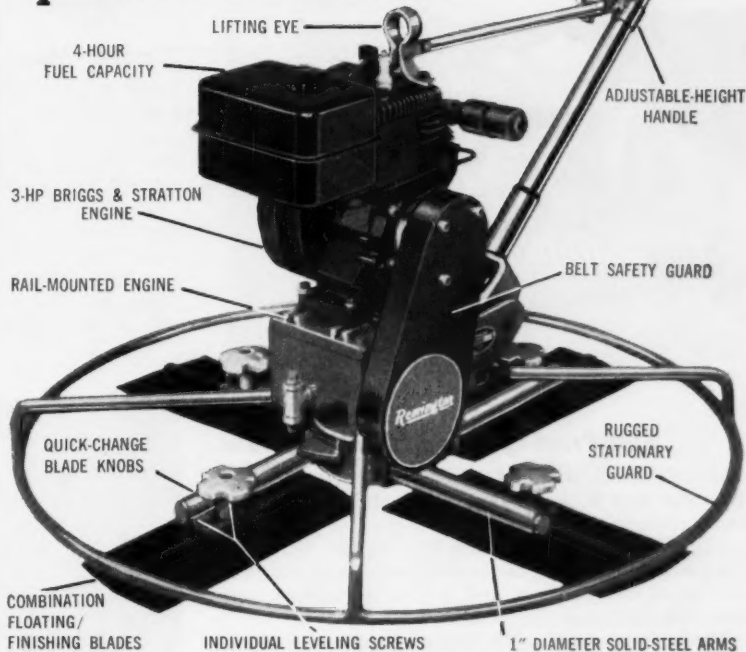
Improved Wheel Tractor

The current model of the four-wheel-drive, four-wheel-steer Napco Crab tractor is equipped with a fiberglass hood and grille and a bigger 6-cyl gasoline engine that produces 75 hp.

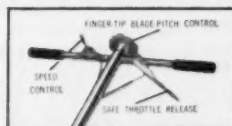
Other equipment includes a 12-volt electrical system, four-wheel hydraulic power brakes, torque converter, power steering, and a hydraulic reversing clutch. — **Napco Industries, Inc., 834 N. Seventh St., Minneapolis 11, Minn.**

New Remington Power Trowels

combine outstanding features for maximum reliability and operator convenience



Shown above is Remington's new 3-hp Model T-434. In addition, there's a new 2¼-hp model with 28" sweep. Both are packed with dependable features that won't let you down. These new Remington power trowels feature simplified adjustments and finger-tip controls for maximum operator working ease, comfort and safety. Mail coupon for complete specifications.



Finger-tip controls—All controls mounted on handle for easy operation.



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Vacuum Cleaner for Drilling Collects Dust, Recovers Water

The Pullman Vacmobile collects dust in dry drilling operations or recovers water on wet drilling jobs. The unit consists of a collecting tank with a filter that prevents clogging and a hose that connects to the drill and carries dust to the tank.

Three models are available. Their horsepower ratings are $\frac{3}{4}$, $1\frac{1}{4}$, and $1\frac{1}{2}$. All are designed for 0 to 60 cycles, 115-v, ac or dc current, but units for other voltages are available also. Two of the models can be converted to blowers.—Pullman Vacuum Cleaner Corp., 25 Buick St., Boston 15, Mass.



Tractor-Mounted Rake

Three-point hitch tractors can be equipped with a rake attachment that also mounts a scarifier or a grader blade. The model RH York rake adjusts to five working positions and can be angled to either side. It rakes a swath from $7\frac{1}{2}$ to 10 ft wide.

The scarifier can be attached to the rake frame. The points are reversible and replaceable. They penetrate to a depth of 6 in. and cover a width of 6 ft. The grader blade clamps to the front of the rake teeth and operates in the same positions as the rake.—York Modern Corp., Unadilla, N.Y.

Self-Priming Pump Is Submersible

A double shaft seal and a plastic sleeve between the rotor and stator make the Weda self-priming pump completely submersible. It weighs 96 lb and can pump 370 gpm including 30% solids. Running dry for too long or an incorrect direction of rotation will cause overheating, and a built-in device will automatically stop the pump.

The body of the pump is made of aluminum alloy, but the impeller is stainless steel. One lubrication point supplies grease to the entire pump.—Motor-amic Inc., 2120 Market St., San Francisco 14, Calif.

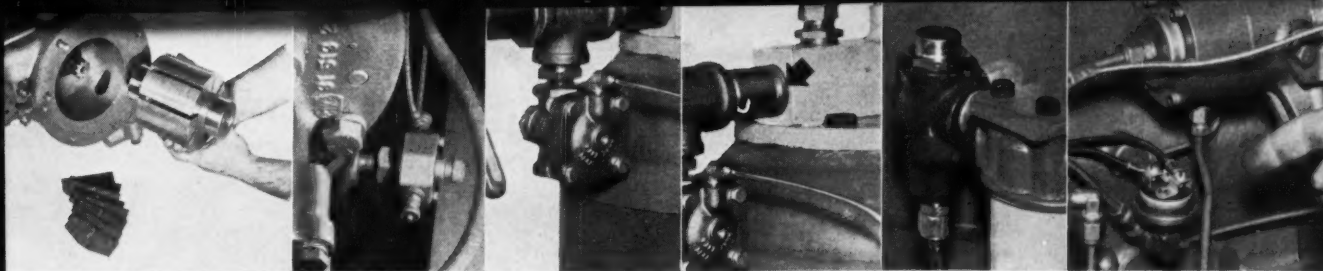


Conveyor Attachment Stockpiles Bulk Materials

A centrifugal thrower unit on the Stephens-Adamson Swivel-Piler throws bulk materials from the discharge end of a conveyor into large stockpiles. The unit includes a receiving hopper and a swivel joint and can be mounted under the discharge end of any belt conveyor.

An adjusting lever raises or lowers the trajectory of the materials from 8 to 40 deg. The thrower swivels horizontally within an arc of 270 deg. The unit is available with a 10 or 16-in.-wide belt.—Stephens-Adamson Mfg. Co., Ridgeway Ave., Aurora, Ill.





A Le Roi exclusive—"double-life" rotors for both low and high pressure cylinders. When vanes wear one side of rotor slots, simply turn the rotor end-for-end. Rotors can't be assembled wrong. Cylinder and bearing retainers are precision mated and dowelled.

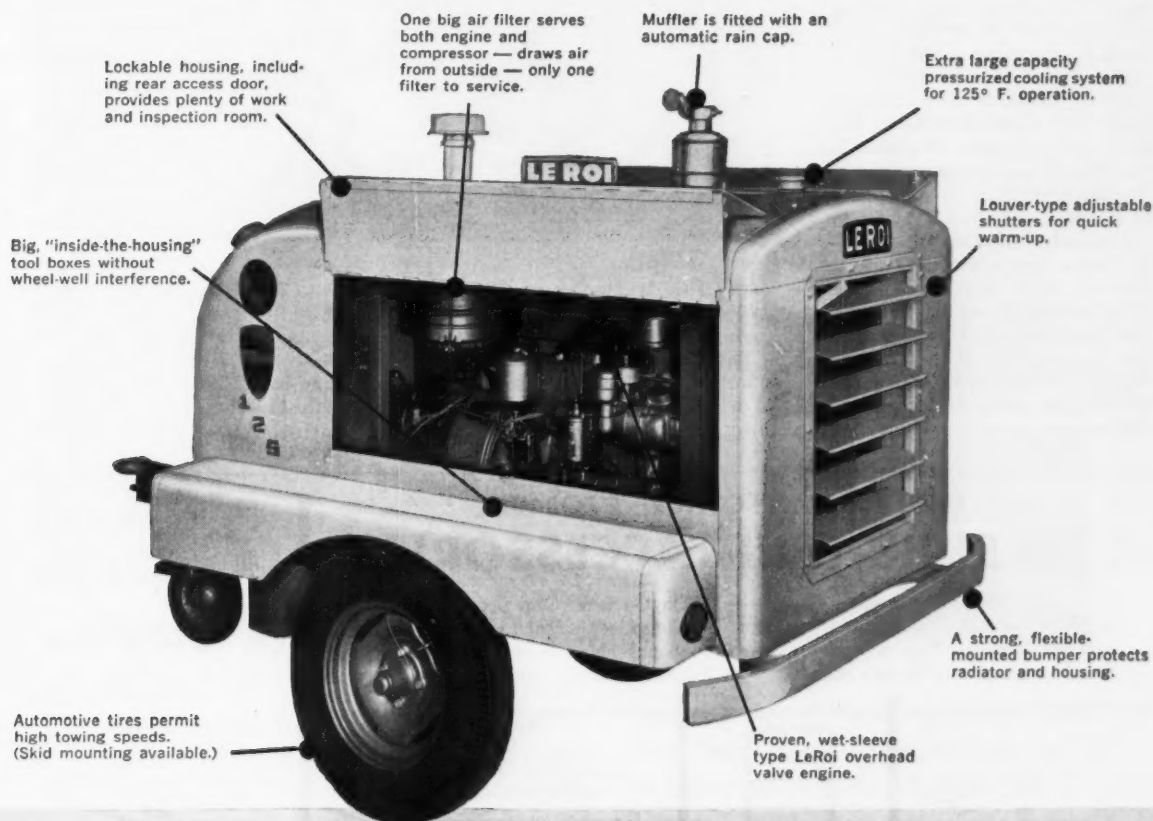
A high air temperature switch is located at the discharge connection of the high pressure cylinder. It immediately cuts off engine if temperature of air-oil mixture in air-end exceeds 230° F.

A "dump" valve instantly releases air pressure in receiver when compressor is shut down. This eliminates possibility of oil backing-up into the compressor air-end.

Orifice, located in receiver outlet, prevents insufficient oil cooling and lubrication of compressor air-end. It automatically insures a minimum of 40 pounds of pressure in the air receiver.

Thermo-by-pass valve insures proper lubrication of compressor air-end during warm-up. Oil is directed to air-end oil pump until oil reaches 130° F. Valve then closes and oil circulates through oil cooler.

Should engine oil pressure drop too low for any reason, this cut-off switch automatically stops engine. Usually found only on larger machines, feature is standard on the 125RG2 rotary.



LIGHTEST AND SLOWEST RUNNING IN ITS CLASS

This 2280-lb. lightweight compressor is designed to save you time, manpower, and money whenever you need dependable 125-cfm air supply.

It's the lightest portable 125 rotary on the market — built with the operator in mind. One man can easily swing it into position on the job-site. And it's balanced for fingertip liftability — with handles on the tow bar and caster wheel to prevent "knuckle-busting."

Le Roi design is easy on the pocket, too. The rotary delivers 125 cfm of free air at 100 psi at only 1600 rpm — 150 to 400 rpm slower than other makes. This means longer engine and compressor life. What's more, superior air-end accessibility cuts down-time and costs for vane inspection and servicing.

See the 125 rotary at your Le Roi distributor's showroom. Or write for Bulletin 123 to Le Roi Division, Westinghouse Air Brake Co., Milwaukee 1, Wisconsin.

LE ROI 125 ROTARY COMPRESSORS



PG-63

PORTABLE AND TRACTAIR® AIR COMPRESSORS • STATIONARY AIR COMPRESSORS • AIR TOOLS

Utility Tractors Tackle Variety of Jobs

Two wheel tractors and one crawler tractor have been added to the Case line of utility equipment. The 530 wheel tractor handles a loader or a backhoe or works as a drawbar unit. A 47-hp Case gasoline engine powers the tractor through a shuttle transmission with eight speeds in both forward and reverse. Maximum travel speed is 18 mph.

The front-end loader has a 2,000-lb capacity and develops 5,500 lb of breakaway force. Biggest of five buckets available for this tractor has a capacity of 1 yd. The backhoe digs to a depth of 14 ft and reaches 16 ft 9 in.

A smaller addition to the utility line is the 430 wheel tractor powered by a 38.5-hp Case gasoline engine. Standard transmission has four speeds forward and one in reverse; the eight-speed shuttle transmission and power steering are optional; a diesel engine will be available later in the



year. This tractor can handle a 1,200-lb-capacity loader or a backhoe that digs to a 10-ft depth.

The 310D crawler tractor exerts a pull of 5,815 lb and can work as a loader, straight or angling dozer, or backhoe. It is equipped

with a 42-hp engine and the shuttle shift transmission. The loader handles a $\frac{3}{4}$ -yd bucket, exerts a 7,000-lb breakaway force, and lifts 3,500 lb to a dumping height of 8 ft 10 in.—J. I. Case Co., Racine, Wis.

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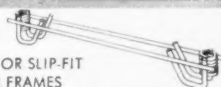
Dayton Sure-Grip accessories are preferred by leading contractors and engineers. National network of distributors assures prompt service — anywhere!



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COIL HANGERS



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OFFSET HANGER FRAMES

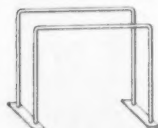
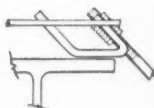
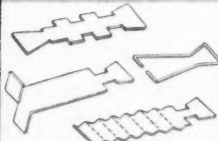


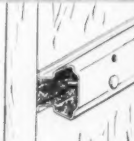
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45° COIL HANGERS



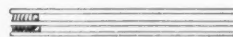
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3000 LB. AND 5000 LB. SNAP TIES



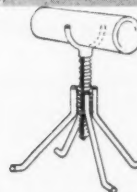
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HILLS CREEK DAM, in western Oregon, is part of the Willamette Valley Project being built by the Corps of Engineers to provide flood control, navigation, power and irrigation. Scheduled for completion in 1961 this 11 million yd. earthfill embankment will be 2400 feet in length, 1600 feet wide at the base and 24 feet at the crest.

Low bidder on the earthmoving phase of this big job was a joint venture of Green Construction Co., Des Moines, Iowa and the Tecon Corporation of Dallas, Texas. These contractors are using a fleet of 28 big Euclids... twenty bottom-dumps of 17 and 30 yd. struck capacities and eight 22 and 27-ton capacity rear-dumps...to haul earth and rock fill to the dam site. The "Eucs"

work two ten-hour shifts six days a week and have marked up an excellent record of high production and job availability.

With over 25 years of experience in building off-highway earthmovers exclusively, Euclid and its world-wide dealer organization offer a greater dimension in types and sizes of equipment that meet any job requirement. Your Euclid dealer can show you how advanced engineering and easier service-ability brings a greater return on investment.



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*Euclid (Great Britain) Limited,
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... a complete line of equipment for heavy earthmoving, mining, logging and many industrial operations ...



"We know the value of a completely engineered ELLICOTT DREDGE"

Says Mr. Leonard Mulbry of the New Smyrna Dredging Company, operating in the waterway community "VENEZIA," at New Smyrna Beach, Florida. "This is our third year of operation with the dredge "Bold Venture" obtained from Ellicott in 1957," continues Mr. Mulbry. "By now we have been able to determine the value of obtaining a completely engineered dredging unit from a reputable company, rather than building one ourselves, or obtaining one from a less well established firm."

"We are more than satisfied with the production and operation of our Ellicott 'DRAGON' Dredge. It is not only well engineered and accurately constructed, but easy and economical to operate. Our records show that *this purchase was the wisest decision we ever made*. Per dollar invested in the dredge and its operation, we are able to get about twice the land area pumped up as by other means. We estimate the *savings will be close to \$500,000* by the time the project is completed."

You can enjoy similar savings with an Ellicott "DRAGON" Model Dredge, designed and manufactured by a company now marking its 75th year in designing and building dredges and dredging equipment. Write for information to Ellicott Machine Corporation, 1605 Bush Street, Baltimore 30, Md.

"MARKING OUR 75TH YEAR"

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ELLICOTT DREDGES

ELLICOTT MACHINE CORPORATION, Baltimore 30, Maryland, U.S.A.; Timberland-Ellicott, Limited, Woodstock, Ontario, Canada; Dragues Ellicott France, Paris, France; Dragas Ellicott do Brasil Ltda., Rio de Janeiro, Brazil; Ellicott de Mexico, Mexico City, Mexico; Ellicott Fabricators, Inc., Baltimore, Maryland; McConway & Torley Corporation, Pittsburgh, Pennsylvania.

Successors to the floating dredge business of the Bucyrus-Erie Co. and the American Steel Dredge Co. Complete engineering, design and construction services.



New Publications

These catalogs and bulletins from manufacturers contain useful information about construction equipment and materials. To obtain a copy, write directly to the manufacturer at the address given.

AUTOMATIC BATCHING — A 12-p handbook describes procedures and equipment for automatic batching. It outlines applications, and gives details of controls, indicators, and recorders for Howe batching systems. The handbook has a section that enables the reader to plan an automatic batching system to fit his needs. —Howe Scale Co., Rutland, Vt.

INSULATING CONCRETE — A bulletin covers Perlite expanded perlite insulating concrete for roof decks and floor fills. It includes tables showing typical mix design, physical properties, and thermal conductivity of Perlite, plus load test data for roof decks at various spans. The 8-p bulletin has specifications and fire ratings. —Perlite Dept., Great Lakes Carbon Corp., 612 So. Flower St., Los Angeles 17, Calif.

TRAILERS — Features of the Model GTY triple-axle lowboy trailers are covered in a publication issued by Transport Trailers, Inc. The brochure includes specifications and construction details of the trailers that range in capacity from 30 to 60 ton. —Transport Trailers, Inc., Cedar Rapids, Iowa.

RIPPING — An 8-p brochure explains the principles, methods and operating technique of seismic analysis to determine the rippability of materials. The brochure, Ripping With Seismic Analysis, shows how earthmoving costs can be reduced in some materials by ripping instead of blasting. A table shows the rippability of materials such as limestone, sandstone, gneiss, caliche, and conglomerate. —Caterpillar Tractor Co., Peoria, Ill.

CONCRETE MIXER — Koehring-Johnson tilting concrete mixers, available in capacities of from 2 to 7½ cu yd, are described in a 4-p brochure. It illustrates the frame construction, drums, hy-

330,000 yards of rock removed

by this shovel rigged with  Tiger Brand Wire Rope



In 15 ten-hour working days this 2½ yard shovel scooped out 30,000 cubic yards of hard sandstone, shale and clay on the rebuilding of Route 39 near Salineville, Ohio. It had just finished another job where it had excavated 300,000 yards of rock . . . with no appreciable downtime.

USS Tiger Brand Wire Rope provides the tough, strong muscles that keep equipment working at top efficiency. These hoist lines must take the shock of digging rock. They must resist abrasive sandstone dust and severe vibration. In spite of these rough conditions, Tiger Brand Rope gives long service life with low cost.

No matter what kind of equipment you operate—shovels, scrapers, dozers, draglines, there's a USS Tiger Brand Wire Rope designed for the job.

Why Tiger Brand Rope is your best buy

It's designed by the country's leading wire rope engineers. It's made by *one* company that maintains the most complete research and manufacturing facilities in the steel industry. When you buy Tiger Brand, you get the right rope for the job . . . and you can get it quickly from leading distributors in your area. And your installation is no farther than a phone call away from experienced American Steel & Wire field service representatives.

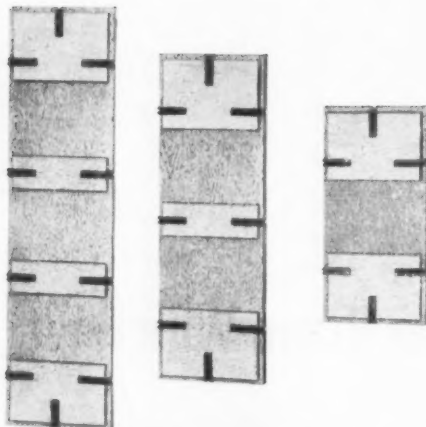
For more information write American Steel & Wire, Dept. 0218, 614 Superior Avenue, N.W., Cleveland 13, Ohio.

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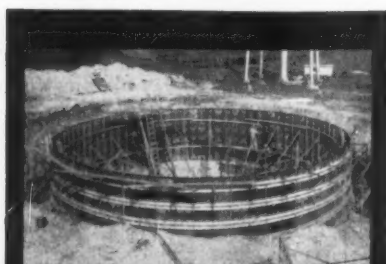
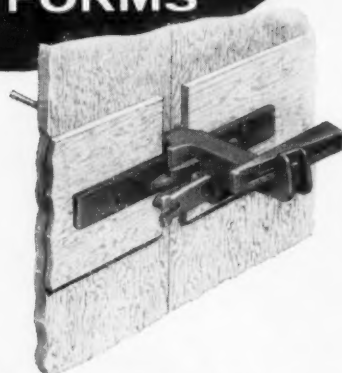
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Receives Tie Rod,
Holds Liner, and
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All-Ply Panel Forms



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ORDINARY FOUNDATION JOB —
Minimum alignment and
bracing needed

SUPERIOR All-Ply Panels are used in all types of construction—for forming ordinary residential foundations to intricate high walls.

The great strength and rigidity of All-Ply Panel Forms are provided by exterior grade $1\frac{1}{8}$ " plywood, backed at strategic areas with $\frac{1}{2}$ " plywood. There are no cumbersome metal or wooden frames. Forms weigh less than 5 lbs. per sq. ft. and are easily handled by one man. A special sealer on all surfaces and edges assures long life. Standard sizes are 2 x 4, 2 x 6, and 2 x 8 ft.

The basis of All-Ply superiority and speed is ONE working part (the unique Combination Clamp) which does four separate jobs. A hammer is the *only* tool required for erection and stripping. The absence of frames permit easy stacking and transporting in minimum space. Long life and many re-uses are assured.



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NEW PUBLICATIONS . . .

continued

draulic rams, and design features for charging and discharging.—**C. S. Johnson Co., P.O. Box 71, Champaign, Ill.**

WATERTIGHT CONCRETE — The part played by Pozzolith in producing watertight concrete is discussed in a 6-p bulletin. The publication (P-49b) contains a summary of information on the design and specification of watertight concrete and how Pozzolith reduces shrinkage, bleeding, and segregation to produce concrete that is resistant to the penetration of water.—**The Master Builders Co., Cleveland 3, O.**

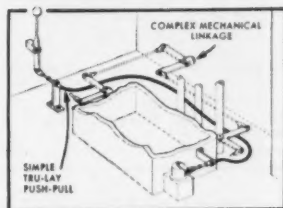
CONCRETE MIXER DATA—A 36-p booklet is designed to help ready-mix concrete and construction firms select truck models and other equipment that will best fit specific job requirements. The booklet covers mixer bodies and drives, weight distribution, facts on mixer body operation, application charts, major mixer body specifications, and tandem specifications on Ford's complete line of industrial engines.—**Ford Div., Ford Motor Co., Rotunda Dr. at Southfield Rd., Dearborn, Mich.**

CRAWLER CRANE—The 200 series crawler crane is the subject of a new catalog. The 20-p catalog (720-CG-3) includes features of the company's positive-pressure backhoe, and a positive rope crowd shovel attachment. The machine is shown as a crane, magnet, clamshell, dragline, shovel, and backhoe.—**American Hoist and Derrick Co., 63 So. Robert St., St. Paul, Minn.**

TRACK PIN PRESS—A new track pin press that removes and installs track pins and bushings on small crawler tractors is illustrated in Bulletin No. TP-9. The press features a high speed ram approach and return, a dual-volume and dual pressure pump, and it services the track with grousers off or on. Operating instructions are included. — **Owatonna Tool Co., 380 Cedar St., Owatonna, Minn.**

DIAMOND DRILLING — Diamond drilling equipment for cutting such materials as concrete, stone, tile, and asphalt is illus-

TRU-LAY PUSH-PULL DATA FILE SHOWS HOW TO SIMPLIFY AND IMPROVE DESIGN



Push-Pull remote controls, shown here, are flexible, have but one moving part, and give a lifetime of accuracy. Mechanical linkages are complex, are made of many parts, wear at many points, and produce increased backlash, lost accuracy, and vibration rattles.

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This Clyde Special Model H-27103, Serial No. X2072, Steel Stiffleg Derrick was purchased new and only used at the Queens Anchorage Throggs Neck Bridge project in Whitestone, N. Y.

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- 150 ft. Boom
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- 40 ft. Sills
- 30 ft. Bullwheel

CLYDE MODEL S-A SINGLE FIXED DRUM REVERSING SWINGER

- 20,000 lbs. single linepull at 75 f.p.m.
- Power with 50 H.P., 720 r.p.m.

Approx. Shipping Weight 10,000 lbs.

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- 20 ft. to 100 ft. 20 tons
- 150 ft. 12 tons

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- Hoist capacity 18,000 lbs. single linepull at 250 f.p.m. Simultaneous booming & hoisting.
- 20" dia. x 22" lg. drums, 45° flange.
- Friction clutches, brakes and boom drum pawl to be air operated.

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NEW PUBLICATIONS . . . continued

trated in 6-p brochure. Bulletin 321 covers the Model 305 light-weight 6-in. diamond drill, the 330 swivel drill, and diamond bits ranging in size from 1/2 in. to 16 in. The brochure illustrates the interchangeability of the drill for air or electric drives, and includes specifications for both systems.—**E. J. Longyear Co., Minneapolis 2, Minn.**

WELDING ELECTRODES — A welding electrode catalog covers Hobart's complete line of electrodes, gas welding rods, submerged arc welding flux, and automatic welding wire. The 26-p catalog contains classifications, specifications, and application diagrams. — **Hobart Brothers Co., Troy, O.**

UTILITY TRACTORS — Allis-Chalmers describes its series D utility tractor line with matched equipment in a 12-p catalog (UT-111). Four models in the D series powered by gasoline engines, range from 34 to 63 hp. Engine details, design, and specifications are included.—**Farm Equipment Div., Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.**

ROCK BITS—Tungsten carbide rock bits are discussed in a 4-p bulletin (NR-87-C). Illustrated are bottom drive, shoulder drive, and taper socket bits. A chart provides data on the firm's complete line of bits plus information on diameters and thread types.—**Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.**

ROLLERS—Rolcor has issued a bulletin featuring its complete line of vibratory and static rollers. Included are a 1-ton and 2-ton static roller, a 2-ton vibrating roller, and a tow-type vibrating unit. Bulletin 60-3 also illustrates a trailer for transporting the rollers.—**Rolcor Div., Rosco Mfg. Co., 3118 Snelling Ave. So., Minneapolis 6, Minn.**

TRENCHER — Model MA-2 Trench Devil, a low-cost trencher that can be operated by one man, is described in a 6-p brochure. Included are applications and specifications of the trencher, which has five digging widths, from 2 3/4 in. to 8 in., at depths up to 54 in.—**Arps Corp., New Holstein, Wis.**

What's it costing you

to slow down and shift?

It could well be costing you important time because of slower job cycles. This time is money you'd be saving with TORQMATIC DRIVES in your equipment—and the proof is on TORQMATIC owners' books.

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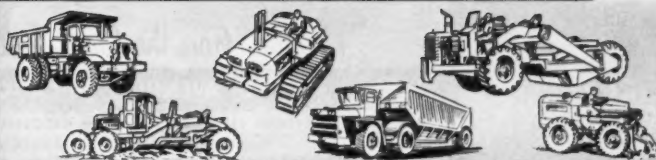
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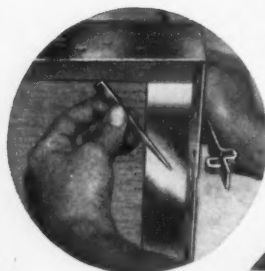


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installation...

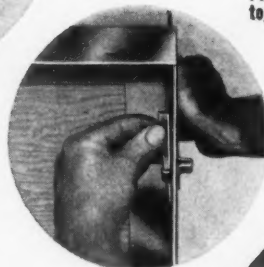
secret of FASTER CONCRETE FORMING

SECONDS
TO INSTALL
UNI-FORM TIE
AND ASSEMBLE PANELS

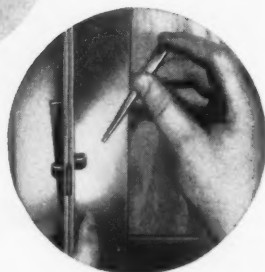
UNIVERSAL FORM CLAMP CO.



1. UNI-FORM Tie Loop placed in square tie hole of Panel.



2. Tie Key set into the Tie Loop. Panel and Tie are now locked together into integral unit.

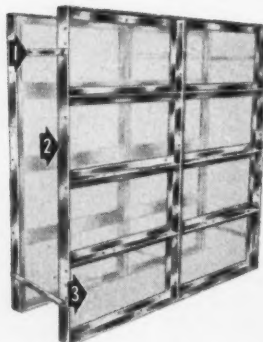


3. Next UNI-FORM Panel is placed in position. Tie Loop automatically enters square tie hole. Key is dropped in—assembly is complete. NO COMING BACK TO "FISH" TIES.

When you can tie and lock two concrete form panels in a few seconds, you're forming concrete fast! This is exactly what you can do with the UNI-FORM Panel System—the fastest system of forming concrete ever developed.

Faster tying is only one of many UNI-FORM Panel features that makes them *the* pre-fab forms contractors are using on every kind of concrete construction. Write for the UNI-FORM Panel System Catalog and full details . . . or, call your nearby Universal Distributor or Branch Office for personal attention immediately.

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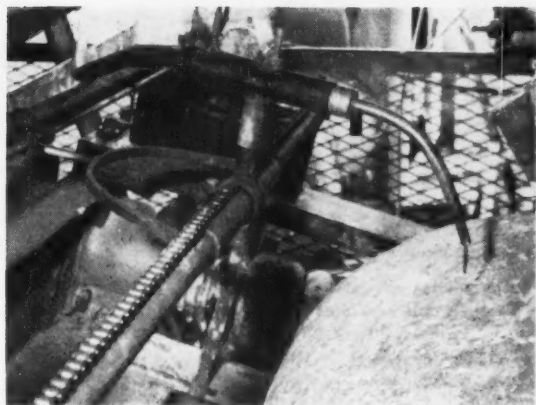
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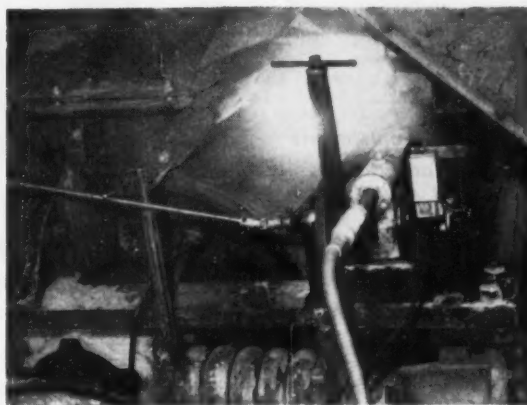
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The Maintenance Shop...



NOZZLE MOUNTING—A link chain moves the semi-automatic welding nozzle along a mounting fixture attached to the crusher.



NOZZLE DRIVE—Flexible shaft drives the chain on one roll; a rod extension transmits power to the chain on the other roll.

Rig Rebuilds Two Rolls at Once

AUTOMATION simplifies roll crusher rebuilding with semi-automatic welding machines. Victor Wenzel, a welding consultant of Rosemount, Minn., devised the process and engineered the equipment that rebuilds worn crusher rolls automatically.

Basic components of Wenzel's setup are a Lincoln ML-2 and an Auto Arc Magna Welder semi-automatic welding machines. A series of electronic and mechanical controls completes the automation of the rebuilding process.

With this system two crusher rolls can be rebuilt at the same time. And 18 lb of Stoddy 134 welding wire is deposited on each roll in one hour. The wire has a high compressive strength and was developed for use on crushing equipment for parts that are subject to abrasion and impact.

The Components

Other components of this rebuilding system are an adjustable mounting fixture for the welding nozzle, a drive mechanism, limit switches and sequencing controls, a remote control station, and two gas-driven portable welders.

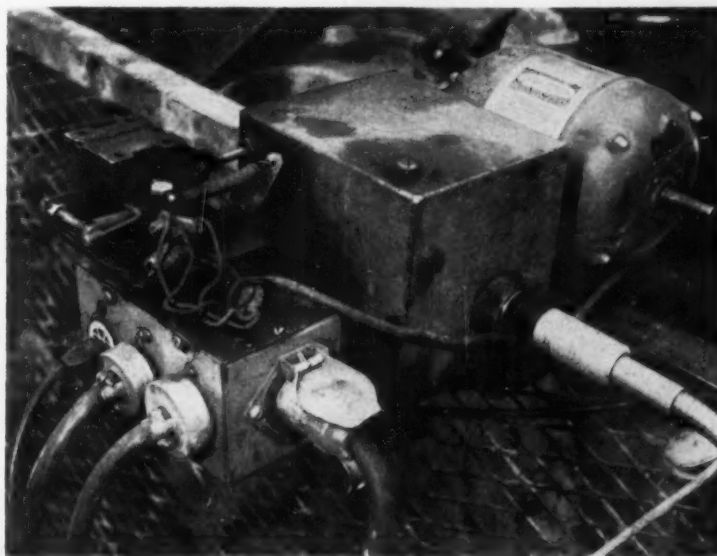
An adjustable mounting fixture for each roll is positioned on the crusher frame and supports the semi-automatic welding nozzle as it travels over the working area. A link chain attached to the ends

of the nozzle support moves the nozzle horizontally across the face of the roll. The return portion of the link chain travels through the inside of a pipe that is part of the nozzle support.

A drive mechanism powered by 1/2-hp electric motor moves the link chain. The motor transmits power to a 36-to-1 gear reduction unit through a flexible shaft. A

universal coupling and a shaft extension transmit power to a similar setup on the other crusher roll for simultaneous rebuilding of both units.

Limit switches and sequencing controls automatically reverse the nozzle at the end of each longitudinal weld bead. These controls also actuate a rotating device that turns the rolls at the end of



DRIVE MECHANISM—A 1/2-hp electric motor supplies power to move the welding nozzles. Sequencing controls for the automatic operation are mounted at the side of the motor.

MAINTENANCE SHOP . . .

continued

the bead. Longitudinal beads are deposited 2½ in. apart across the entire width of the roll. Stringer beads connect the longitudinal beads and are deposited while the roll turns ahead at the end of each pass.

Indexing Adjustments

After one complete revolution of a roll, a horn blows, warning the operator to adjust the rotation indexing so that the next bead will be deposited adjacent to the previous pass.

Subsequent stringer beads cross the previously deposited longitudinal beads, but the additional overlay is negligible because of the rather high amperage (375) and the speed of the nozzle travel while the roll rotates. The rig can be indexed to deposit adjacent to the longitudinal bead on the step-over, but this would necessitate an arc interruption. Mr. Wenzel feels that the additional passes on the ends of each lateral bead are the lesser of two evils and have no adverse effects.



REMOTE CONTROL—Victor Wenzel, who developed the system, holds remote control with which he operates the automatic roll rebuilding machine from a station near crusher.

Rolls also can be rebuilt circumferentially. Flipping two switches is all it takes to accomplish this. Circumferential rebuilding with 7/64-in.-dia Stoodly nickel manganese is used on badly worn rolls to return them to their original dimensions. This buildup is then overlaid with Stoodly 134 to give the rolls a hard surface.

Two Miller 500-amp gas-driven portable welders supply power

for welding. Welding voltage is 30-32, and amperage is set at 375, dc reverse polarity. Travel speed of the welding nozzles is about 32 in. per min.

The entire welding system can be set up in about 45 min. It is operated from a remote control station near the crusher. This crusher rebuilding setup was in operation near Minneapolis, but it is portable and can be adapted to any machine or location.



Gritty mud would mar the markings on most tapes!

This Chrome Clad® tape is Lufkin's 50-foot ANCHOR model. It looks quality in its hand-sewn leather case . . . it is quality.

A special kind of electroplating protects the tape from the damage of mud, sand and grit. The bold black markings are bonded to the steel base . . . protected by layer after layer of electroplating . . . topped by a final coat of tough chromium. Glare free, corrosion resistant, longer lasting—this is the tape preferred by every professional. Available with markings in feet, tenths and hundredths.

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What DELAWARE does about narrow roads

Delaware decided that the old pavement on six miles of State Route 9 in Kent County was too narrow and dangerous for today's traffic.

Last year, the State demonstrated the ease and economy with which such an objectionable bottleneck can be widened and strengthened with hot-mix Texaco Asphaltic Concrete.

First, the existing road was widened 3½ feet at each side with a 6-inch thickness of coarse-graded Texaco Asphaltic Concrete, as shown by one of the accompanying photographs. Then, for the purpose of increasing the load-carrying capacity of the highway, it was resurfaced completely with the same type of asphalt mix used in the widening operation. Finally, the highway was topped with a dense, fine-aggregate Texaco Asphaltic Concrete wearing surface.

Wherever narrow roads present dangerous bottlenecks, convert them into wider, safer and more durable highways at moderate cost as Delaware did, with hot-mix Texaco Asphaltic Concrete.

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CONTRACTOR

Standard Bitulithic Company, Mount Pleasant, Del.



Old, narrow pavement on Delaware's Route 9 was widened 3½ feet on each side with a 6-inch thickness of hot-mix Texaco Asphaltic Concrete.

Laying coarse-graded Texaco Asphaltic Concrete over widened pavement, followed by a wearing surface of fine-aggregate Asphaltic Concrete.



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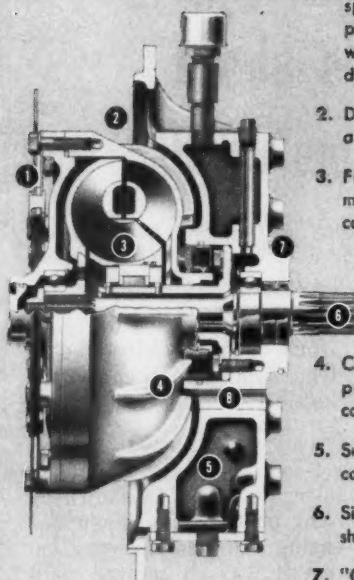
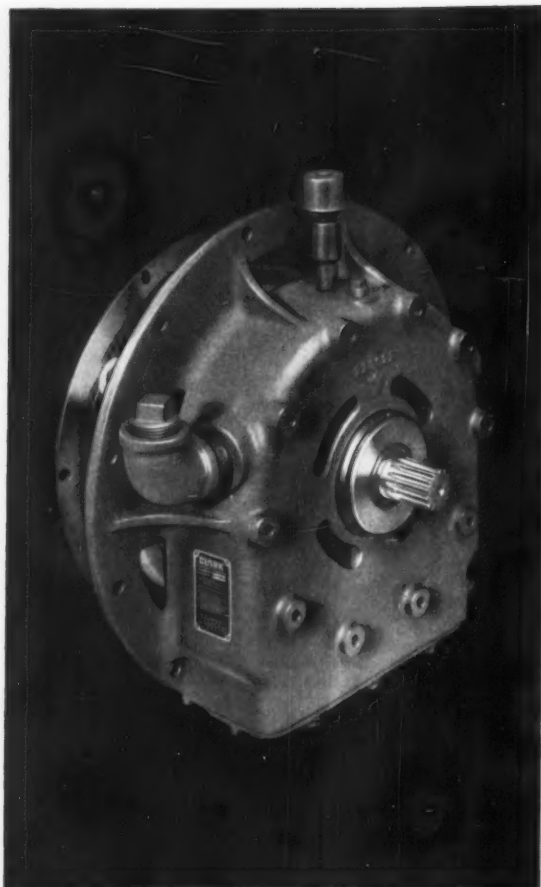
Please send me your two brochures containing helpful information on heavy-duty, intermediate and low-cost types of Asphalt construction for highways, streets, airports, etc.

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- For industrial power transmission of engines in the 15 to 40 hp, 80 lb-ft class...
- Including small cranes and hoists
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The air-cooling feature permits this Clark unit to be used with air-cooled or liquid-cooled engines without the need for auxiliary lines, coolers or fans.

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Number of copies of this issue printed 52,332

A	
Acme-Hamilton Mfg. Corp.	224
ACROW Corp. of America	237
Aeroquip Corporation	150
Alemite Div., Stewart-Warner Corp.	192-193
Allis-Chalmers	26-27, 243
Allison Div., General Motors Corp.	259
American Bridge Div.,	
United States Steel Corp.	80-81
American Chain & Cable Co., Inc.	257
(Automotive & Aircraft Div.)	
(Wright Hoist Div.)	219
American Manganese Steel Div.,	
American Brake Shoe Co.	156-157
American Steel & Wire Div.,	
United States Steel Corp.	255
Atlas Powder Co.	138-139
Austrian-Western Works, Const. Equipment	
Div., Baldwin-Lima-Hamilton Corp.	60-61
Autocar Div., White Motor Co.	103
B	
Barber-Greene Co.	48-49
Bethlehem Steel Co.	170, 247
Brockway Motor Trucks Div.,	
Mack Trucks Inc.	3rd Cover
Buffalo-Springfield Co., Div.	
Koehring Co.	184-185
C	
Caterpillar Tractor Co.	51, 118, 119
Champion Spark Plug Co.	128-129
Chevrolet Div.,	
General Motors Corp.	20-21
Chicago Pneumatic Tool Co.	206-207
Clark Equipment Co.	
(Automotive Div.)	264
(Construction Machinery Div.)	
164-165, 166-167, 168-169	
Cleveland Trencher Co.	190
Clevite Service Div., Clevite Corp.	230
Clyde Iron Works Inc.	149
Commercial Shearing & Stamping Co.	152-153
Cotta Transmission Company	228
Cummins Engine Co.	109, 110-111, 112-113, 114
Curtiss-Wright Corp.	
(South Bend Div.)	147-148
D	
D-A Lubricant, Inc.	104
Dayton Sure Grip & Shore Co.	252
Dietz Co., R. E.	188-189
Dixon Valve & Coupling Co.	241
Donaldson Co., Inc.	63
Douglas Fir Plywood Association	176-177
E	
Eaton Manufacturing Co. (Axle Div.)	229
Economy Forms Corp.	238
Electric Steel Foundry Co.	181-182
Ellicott Machine Corp.	254
Euclid Div., General Motors Corp.	30-31, 144-145, 253
F	
Federal-Mogul Service Div.,	
Federal-Mogul-Bower Bearings, Inc.	15
Fibre-Metal Products Co., The	245
Ford Motor Co.	
(Ford Div.)	136-137
(Industrial Engine Div.)	240
Fram Corp.	222
Fuller Manufacturing Co.	24-25, 55
G	
Gar Wood Industries, Inc.	78-79
Gardner-Denver Co.	52-53
General Electric Co., (Lamp Div.)	162
GMC Truck & Coach Div.,	
General Motors Corp.	33, 34-35, 36-37, 38-39, 40
General Tire & Rubber Co.	64
Goodall Rubber Co.	220
Goodrich Aviation Products Co., The B. F.	
Div., The B. F. Goodrich Co.	90
Goodrich Industrial Products Co., The B. F.	1
Goodyear Tire & Rubber Co.,	
(Metal Products Div.)	16-17

Gorman-Rupp Co., The	5
Gray Company, Inc., The	237
Griffin Wellpoint Corp.	107
Gulf Oil Corp.	199, 200-201, 202
H	
Harnischfeger Corp.	126-127
Heller & Co., Walter E.	43
Hobbs Trailers	219, 235
Homelite Div., Textron Inc.	248
Homestead Valve Mfg. Co.	223
Hopto-Warner & Swasey Co.	141
Hough Co., The Frank G.	88-89
Hyster Company	210
I	
Ingersoll-Rand Co.	221
International Harvester Co.	
(Construction Equipment Div.)	213, 214-215, 216-217, 218
J	
Jaeger Machine Co.	6
K	
Kensley & Mattison Co.	196-197
Koehring Co.	
(Buffalo-Springfield Co., Div.)	184-185
L	
Laclede Steel Co.	32
LaCrosse Trailer Corp.	180
Lehigh Portland Cement Co.	236
Le Roi Div., Westinghouse Air Brake Co.	251
LeTourneau, Inc., R. G.	46
LeTourneau-Westinghouse Co.	73, 74-75, 76
Liberty Mutual Insurance Co.	12
Lima Works, Construction Equipment Div.,	
Baldwin-Lima-Hamilton Corp.	57, 58-59
Longyear Company, E. J.	245
Lufkin Rule Co., The	262
M	
Macklin Co., Inc., W. F.	234
Macwhyte Wire Rope Co.	22
Madsen Works, Construction Equip. Div.,	
Baldwin-Lima-Hamilton Corp.	62
Manitowoc Engineering Corp.	46-47
Marion Power Shovel Co.	195
Massey-Ferguson Industrial Div.	233
Master Builders Co.	2nd Cover
Mayo Tunnel & Mine Equipment	246
McGraw-Hill Book Co., Inc.	238
Miller Electric Mfg. Co., Inc.	234
Miller Tilt-Top Trailer, Inc.	23
Milwaukee Electric Tool Co.	28
Mobil Oil Co., Div.	
Socony Mobil Oil Co., Inc.	155
Moretrench Corporation	87
Motorola Communication &	
Electronics, Inc.	82
N	
National Lead Co.	69
Neenah Foundry Co.	257
Northwest Engineering Co.	7
O	
Oliver Corp., The	135
Onan & Sons, Inc., D. W.	122-123
Owen Bucket Co., The	225
P	
Pioneer Engineering Div., Poor & Co., Inc.	3
Porter Co., H. K.	
(Thermoid Div.)	244
Prime Mover Co., The	146
R	
Raybestos-Manhattan, Inc.	
(Manhattan Rubber Div.)	172-173
Remington Arms Co., Inc.	249
Richmond Screw Anchor Co., Inc.	231
Rockwell-Standard Corp.	
(Transmission & Axle Div.)	209
(Universal Joint Div.)	175
Rome Plow Co.	56
S	
Sauerman Bros., Inc.	242
Schild Bantam Co.	10-11
Seaman-Gunnison Corp.	203
Sinclair Refining Co.	179

Socony Mobil Oil Co., Inc.	
(Mobil Oil Co. Div.)	155
Stanco Mfg. & Sales Inc.	246
Standard Oil Co. (California)	54
Standard Oil Co. (Indiana)	70-71
Steel Joist Institute	158
Stow Manufacturing Co.	77
Superior Concrete Accessories, Inc.	256
Symons Clamp & Mfg. Co.	2

T

Texaco Inc.	8-9, 263
The Shovel Co.	142
Timken Roller Bearing Co.	4th Cover
Travelers Insurance Companies, The	18-19

U

Union Fork & Hoe Co.	29
Unit Crane & Shovel Corp.	84-85
United States Axle Co., Inc.	212
United States Rubber Co.	
(Mechanical Goods Div.)	44
(U.S. Royal Truck Tires)	235
United States Steel Corp.	80-81, 239, 255
Universal Engineering Corp.	159
Universal Form Clamp	260

W

Warner & Swasey Co. — Hopto	141
Whiteman Manufacturing Co.	163
Worthington Corp.	29
Wright Hoist Div.,	
American Chain & Cable Co., Inc.	219

■

CLASSIFIED ADVERTISING F. J. Eberle, Business Manager

Employment Opportunities	258
Equipment	
(Used or Surplus New)	
For Sale	258

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Methods Memo . . .



Experimental Tractors

One of the biggest wheel tractors ever built is a 75-ton, twin-engine giant developed by the International Harvester Co. The unit is a combination of two two-wheel tractors, each powered by a 375-hp IH diesel engine. Overall length with a 14½-ft, 8-ton dozer blade is 30 ft. In spite of its size, the tractor can turn inside a 24-ft radius because it bends in the middle where the two tractor units are joined.

The tractor operates in either forward or reverse. The operator's seat and all controls are mounted on a turret that can be rotated to face the direction of travel. The experimental tractor can move at 21 mph, and it can pull about 90,000 lb.

Another development from IH is a utility tractor with a hydrostatic transmission. The 100% fluid transmission does away with all clutches, brakes, gears, gear shifts, differentials, and even the rear axle.

The entire transmission system is composed of only three parts: a pair of radial hydraulic motors—one for each driving wheel—and a variable displacement pump coupled to the engine. High-pressure oil transmits power from the pump to the motors in the wheels. A single lever controls speed, direction of travel, and braking.

Building the Eskimo Way

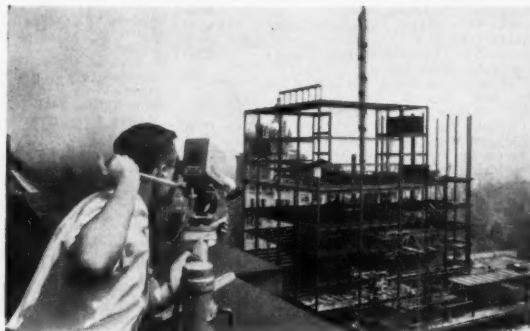
Scientists at a newly formed Ice Research Laboratory at the Massachusetts Institute of Technology are trying to outdo the Eskimo in using ice as a building material. The researchers are working on new methods of mining ice, increasing its strength, and erecting large structures of it.

In the past, Eskimos and the U. S. Army have built snow houses, roads, tunnels, and storage rooms in ice and snow. These applications make use of ice in its natural state. But this, according to the MIT researchers, is a stone (ice?) age activity.

The laboratory is trying to develop various "ice alloys"—materials composed of ice and some other substance that increases its structural strength. During World War II, Britain developed plans for a

2-million-ton aircraft carrier built out of 85% ice and 15% sawdust. The addition of sawdust more than triples the tensile strength of ice.

Scientists have found that other substances added to ice in small quantities also increase its strength considerably. The addition of 4% fiber glass, for example, increases the tensile strength of ice from 200 psi to 2,000 psi.



Sidewalk Supers' Heaven

Neck craning to keep track of skyscraper construction may become a thing of the past for sidewalk superintendents. Closed circuit television and the telephone have teamed up to give the man in the street a close-up of what's doing 390 ft up on a 31-story Western Electric Co. office building under construction in Manhattan.

Western Electric installed two "Sidewalk Superintendents' Tele-Centers" that consist of a TV screen and 20 handy telephones. A sidewalk super can watch the work in progress on the screen and can pick up any of the phones to hear a tape recording describing the activity. Tapes are changed frequently to keep pace with the job.

The TV camera is mounted on the roof of a nearby building. Members of the company's public relations staff man the camera for several hours in the morning, at noon, and in the late afternoon. At other times the camera is aimed at the building, locked in position, and operates unmanned.

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Division of Mack Trucks, Inc.



How **ALLIS-CHALMERS** mounts track support rollers on Timken bearings to reduce friction and maintenance on its HD-21 crawler tractor.

How Allis-Chalmers cut power-robbing friction, boosted drawbar power on its HD-21

IT takes more than big power and weight to deliver the big "push" the easy way this Allis-Chalmers HD-21 does. It takes easy-rolling truck wheels, idlers and support rollers. And Timken® tapered roller bearings reduce friction to give that easy rolling. With friction cut, the 225 HP., 45,500 lb. tractor moves easier and more power goes to the drawbar.

And for extra load capacity, Timken double-row bearings are used in the transmission. All told, there are 59 Timken bearings used in the HD-21 to:

1) *Practically eliminate friction.*

They're geometrically designed and precision manufactured to roll true. They roll smoother—help parts work easier, longer.

2) *Take all loads, cut maintenance.* Their taper enables Timken bearings to take any combination of radial and thrust loads. And because Timken bearings hold shafts concentric with their housings, they make closures more effective in keeping lubricant in, dirt and grime out, maintenance down.

Timken bearings give you many extra advantages. You get service from graduate engineer salesmen, and all the experience of pioneer-

ing tapered roller bearing design. And bearing leadership is maintained by the most modern research and production facilities in the bearing industry.

When you buy Timken bearings you receive: 1) *Quality you can take for granted.* 2) *Service you can't get anywhere else.* 3) *The best-known name in bearings.* 4) *The pace setter in lower bearing costs.* The Timken Roller Bearing Company, Canton 6, Ohio. Canadian Plant: St. Thomas, Ont. Cable: "TIMROSCO". *Makers of Tapered Roller Bearings, Fine Alloy Steels and Removable Rock Bits.*



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